Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

INTRODUCTION OF RAMP-LOSA AT KLM GROUND SERVICES

Dr. Robert J. de Boer

Safety Management International Collaboration Group - Industry day

April 19th, 2013

The Hague

CREATING TOMORROW

Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

CONTENTS

- Background
- Adaptation of standard ramp LOSA
- Results
- Next steps
- Conclusion

BACKGROUND

KLM GROUND SERVICES EXECUTES AIRCRAFT TURN-AROUND AT SCHIPHOL

- Baggage Services
- Pushback and Towing
- Catering and Onboard Supply
- Cleaning
- Aircraft refueling
- Water and toilet services

LINE OBSERVATION SAFETY AUDITS ARE SUCCESFUL IN THE COCKPIT

- Developed by the University of Texas Human Factors Project
- Propagated by ICAO (2002), IFALPA (2005) and FAA (2006)
- Applied by Cathay Pacific, Delta, United Airlines, etc.
- Effective in identifying areas to target to improve safety, e.g.
  - Checklist errors: 70% reduction after identification by LOSA
  - Unstable approaches: 60% reduction

LOSA ATTACKS THE (UNDER-REPRESENTED) FOOT OF THE ICEBERG

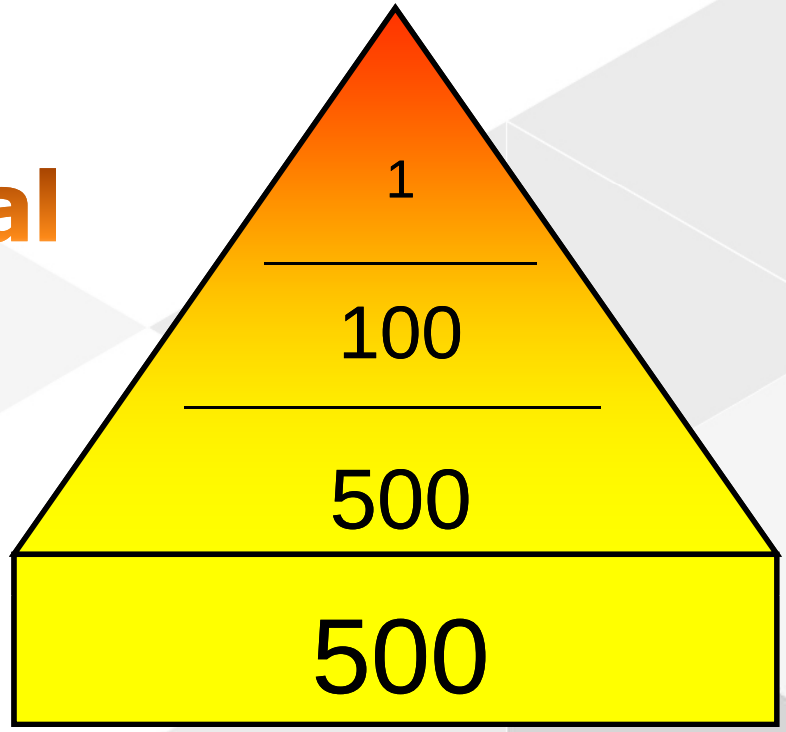
Relative occurences KLM-GS

Substantial

High

Medium

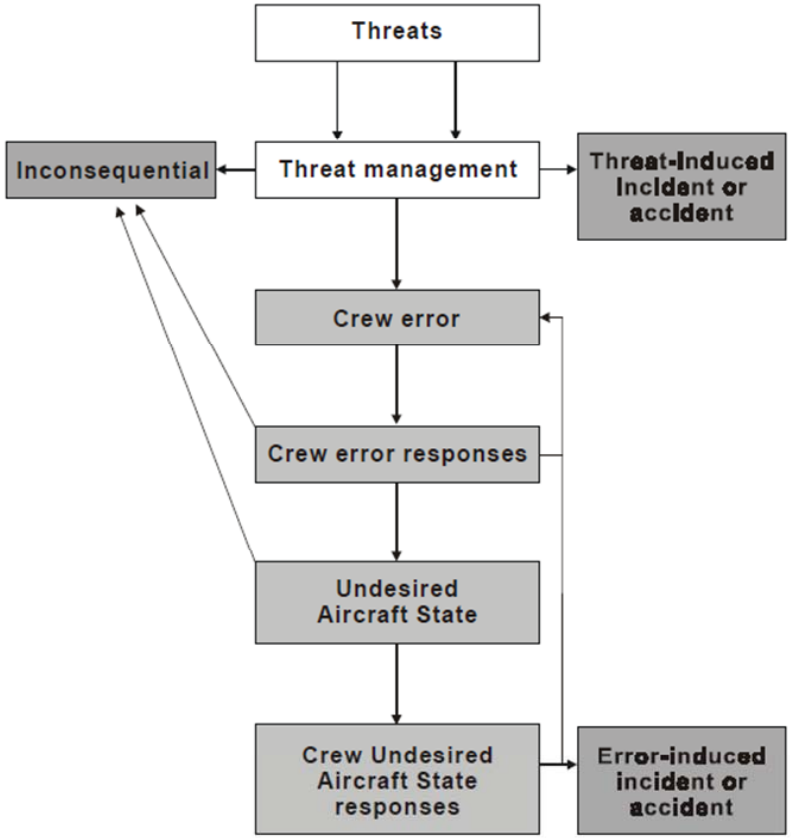
Small



LOSA

Approximate numbers

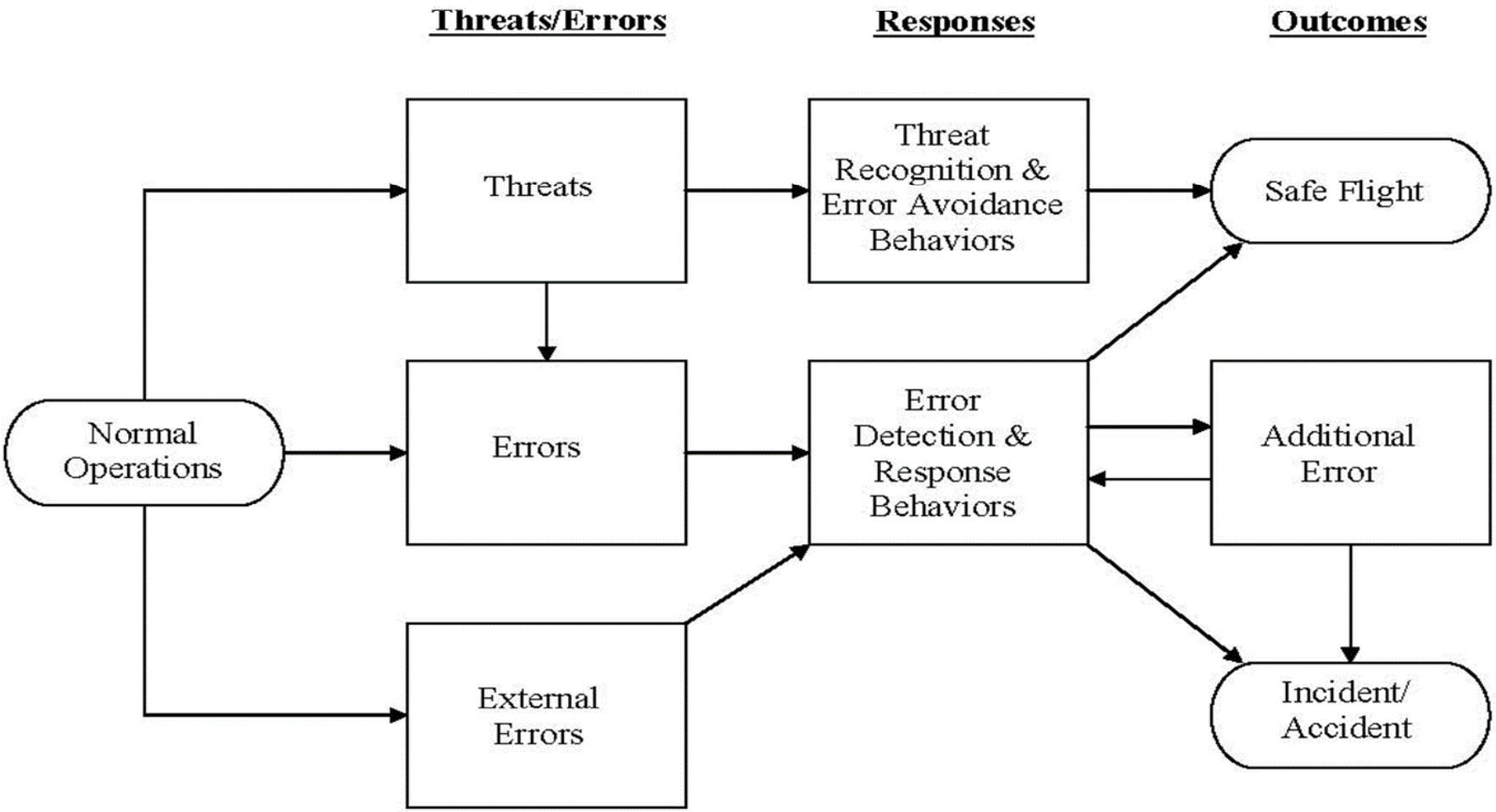
THE ICAO TEM MODEL UNJUSTLY EMPHASIZES THREATS



(ICAO 2002)

- Threats are shown as a precursor to errors
- Identification of threats is susceptible to hindsight bias
- Threats are desirable to “justify” errors
- < 10% of cockpit errors follow a threat (Klinect, Wilhelm et al. 1999)
- Even less linkage expected on platform

DELTA HAS MODIFIED THE TEM MODEL

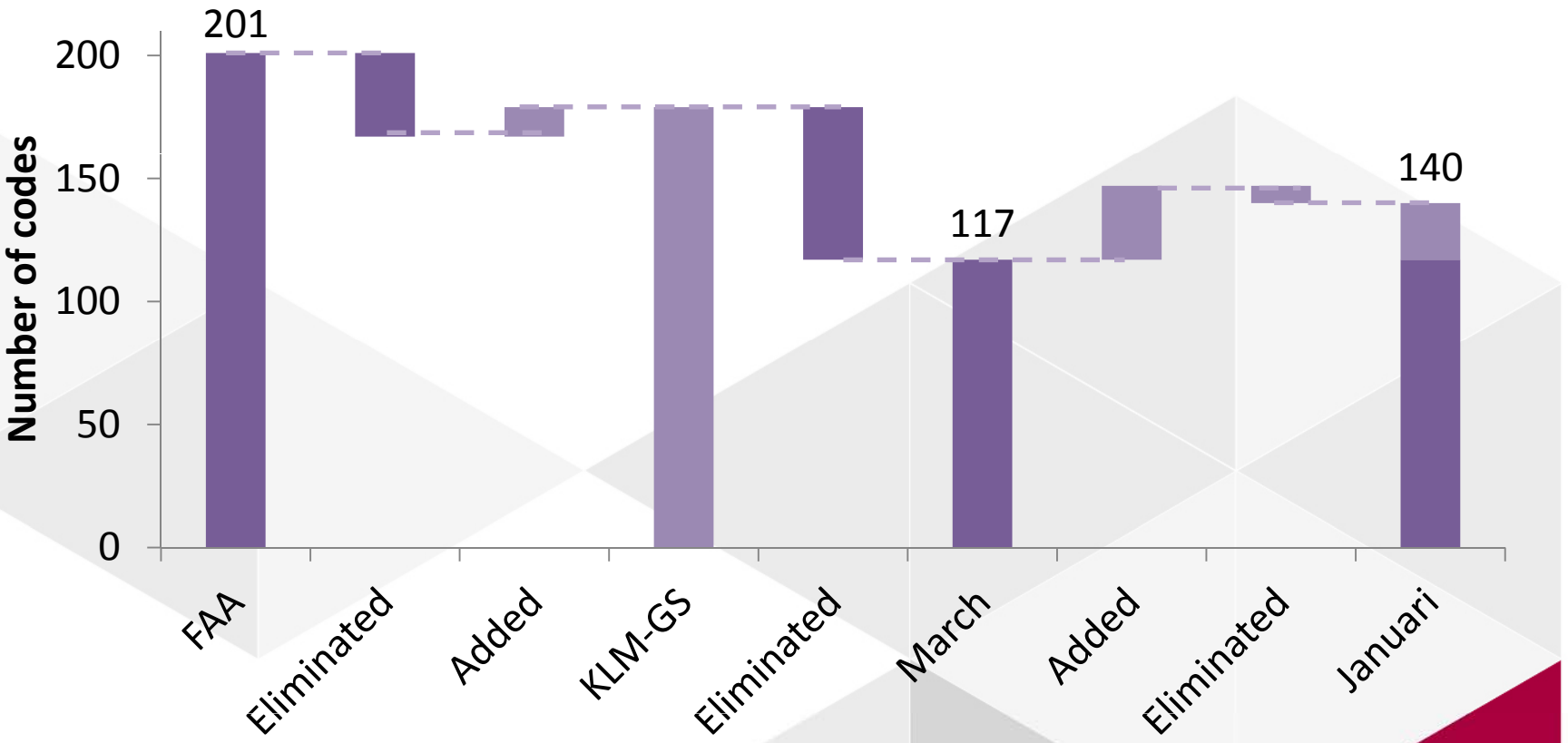


Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

ADAPTATION OF STANDARD LOSA

Dynamic

MODIFICATIONS TO ERROR CODES



Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

Examples

REPHRASED OR NEW ERROR CODES

KLM Ramp LOSA	FAA Ramp LOSA
Aircraft left without following long term parking procedures	Not in LOSA
Equipment restraint area not clear of GSE before arrival	Not in LOSA
Cones not placed	E/C 11. Wing tip markers not placed
Drain mast used by personal in pantry	Not in LOSA
Loose luggage on loading equipment while driving	Not in LOSA
Fuel monitored from within the cabin	Not in LOSA
Chocks removed before connecting towing equipment	Not in LOSA

IMPLEMENTATION

Observers

- Required resources to observe 5% of all turn-arounds
  - 2.6 fte for intercontinental
  - For Europe tbd
  - Based on 4 turn-arounds per observer per day
- Observers recruited from operational staff including those with temporary physical limitations

Training

- One day classroom
- Three supervised audits
- Calibration videos tbd
- Prerequisite: procedural knowledge up to standard

Data entry

- Current tool is MS Access
- Custom ramp-LOSA tool envisaged
- Tablet?

Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

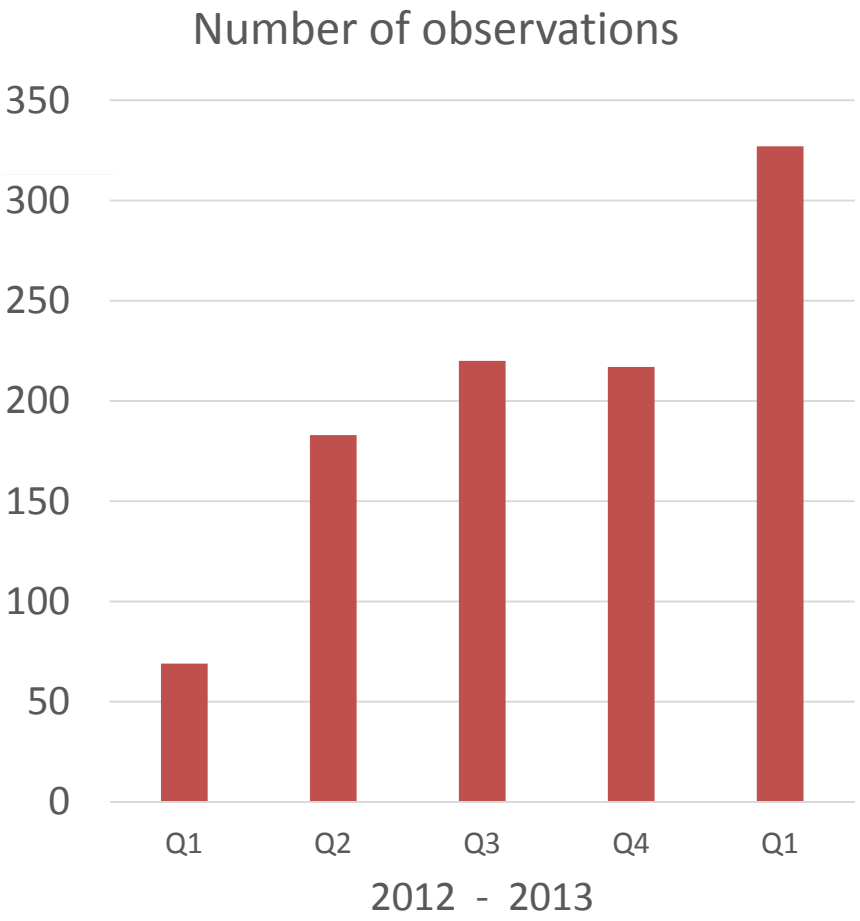
ADHERENCE TO LOSA GUIDELINES

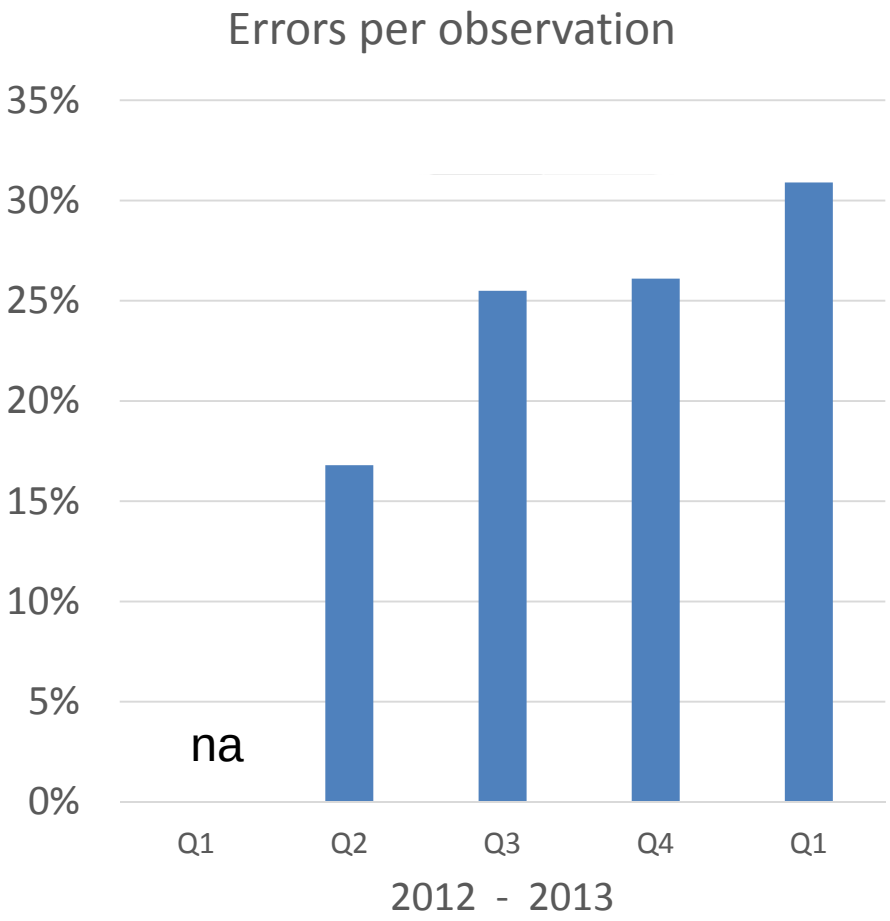
- ✓ peer to peer observations
- ✓ anonymity
- ✓ confidential and non-punitive data collection
- ✓ voluntary participation
- ✓ trusted and calibrated observers
- ✓ union cooperation
- ✓ systematic observations
- ✓ secure data collection repository
- ✓ data verification roundtables
- ✓ feedback to workers.
- ✗ targets for enhancement

RESULTS

Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

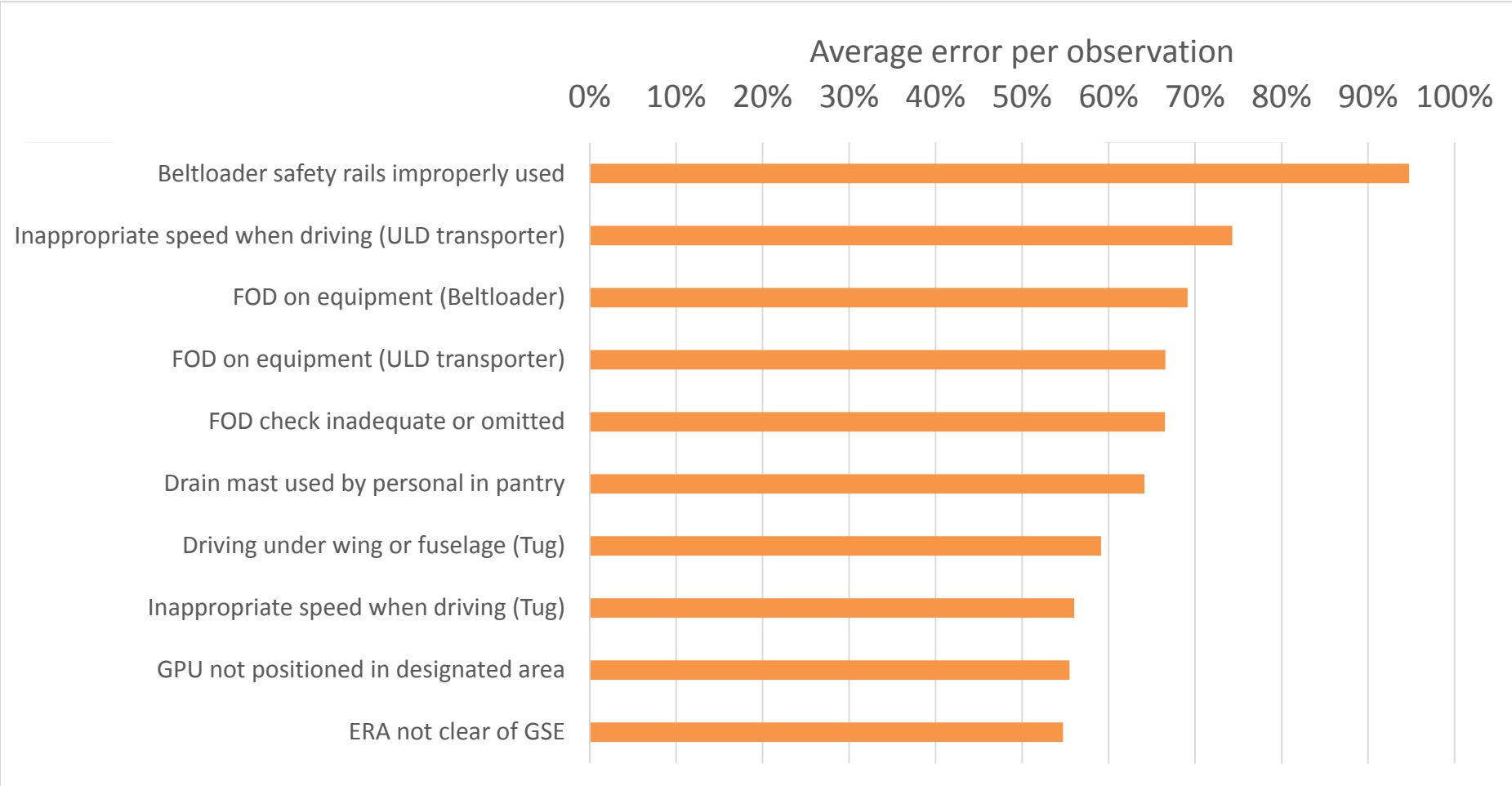
RESULTS 2012 - 2013





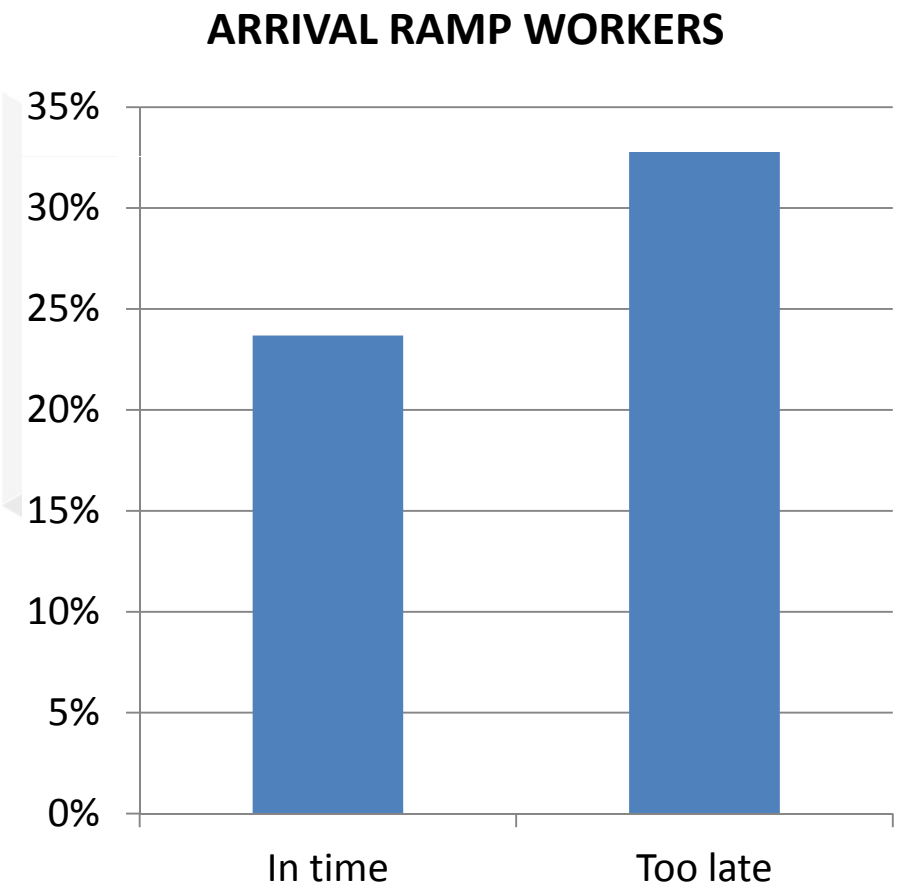
Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

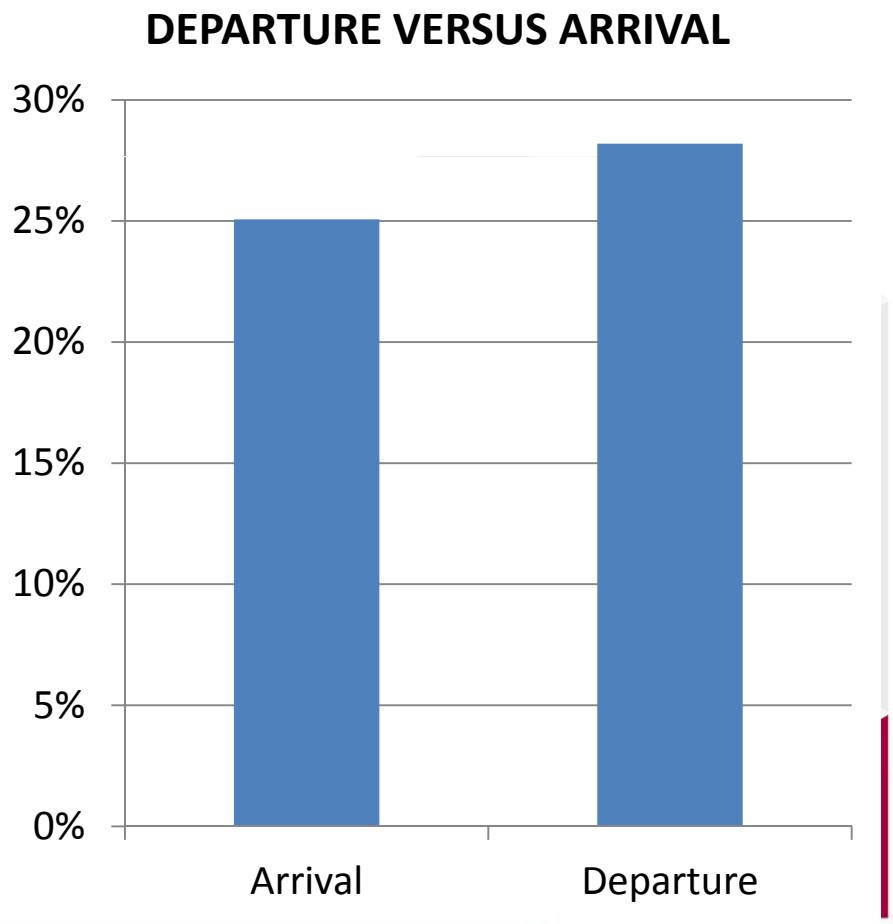
TOP 10 ERROR CODES



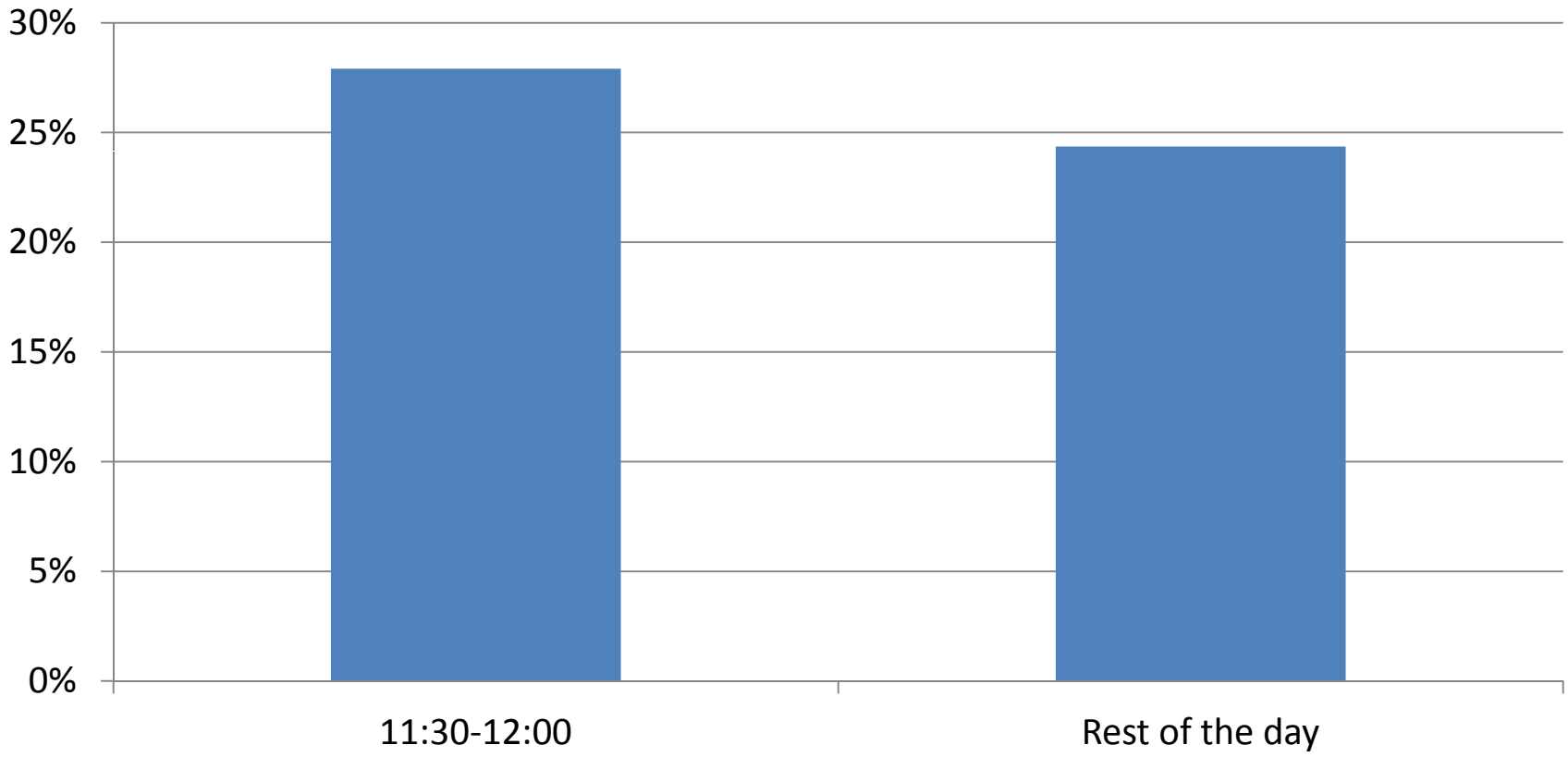
Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

EFFECT OF TIME PRESSURE

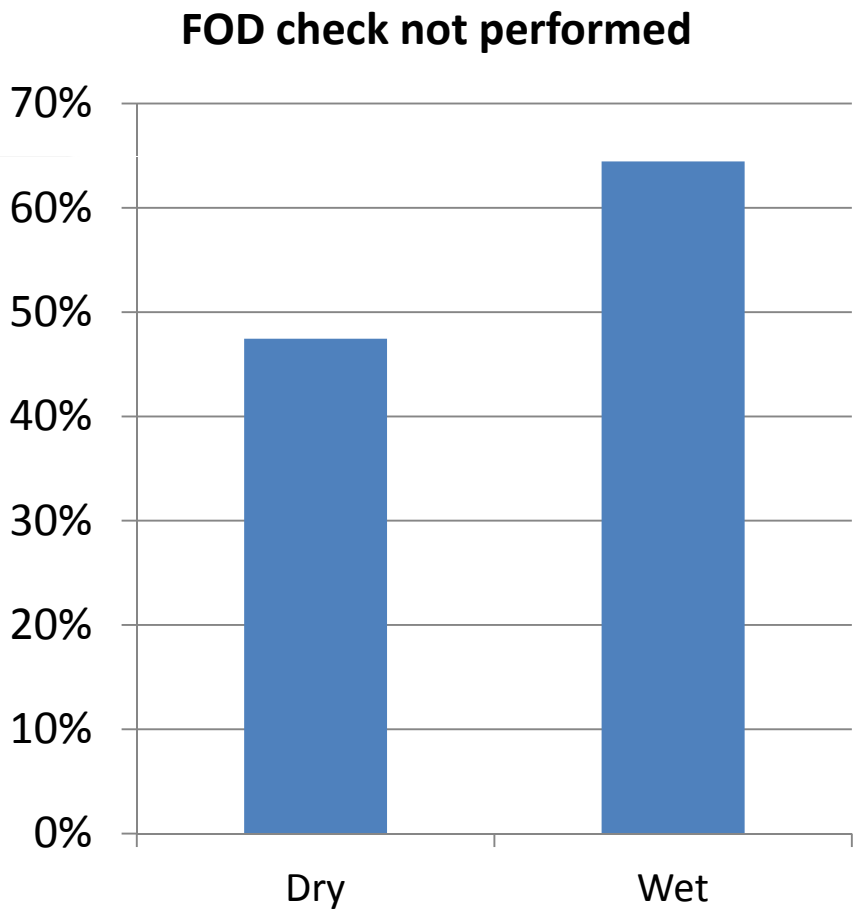


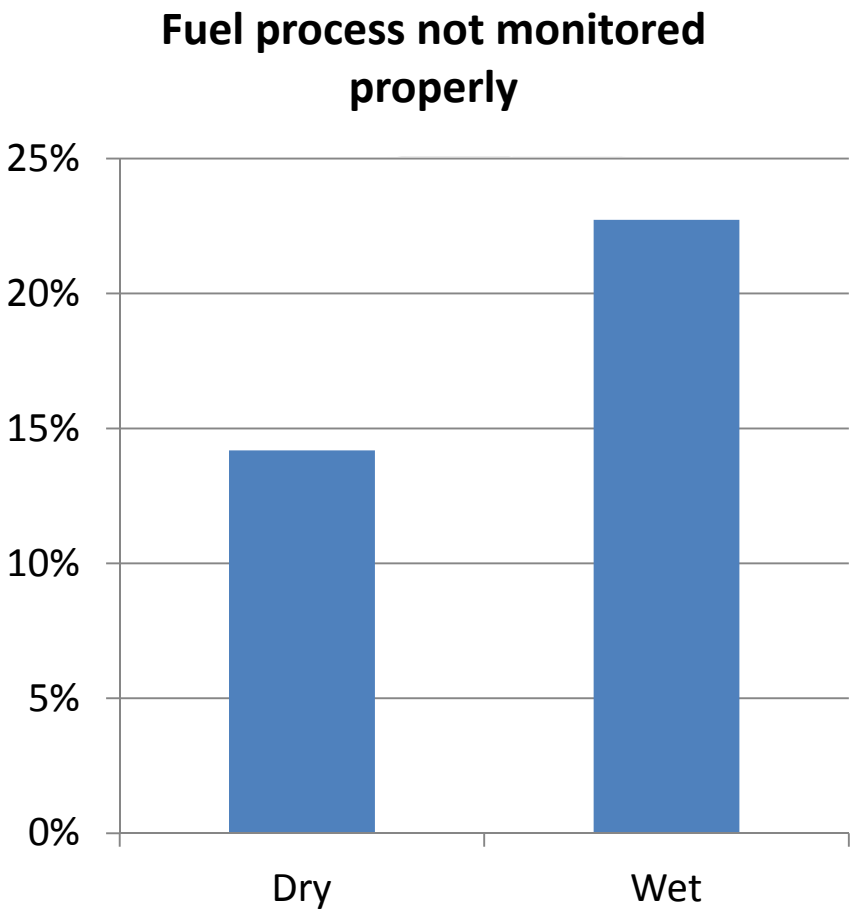


EFFECT OF FATIGUE



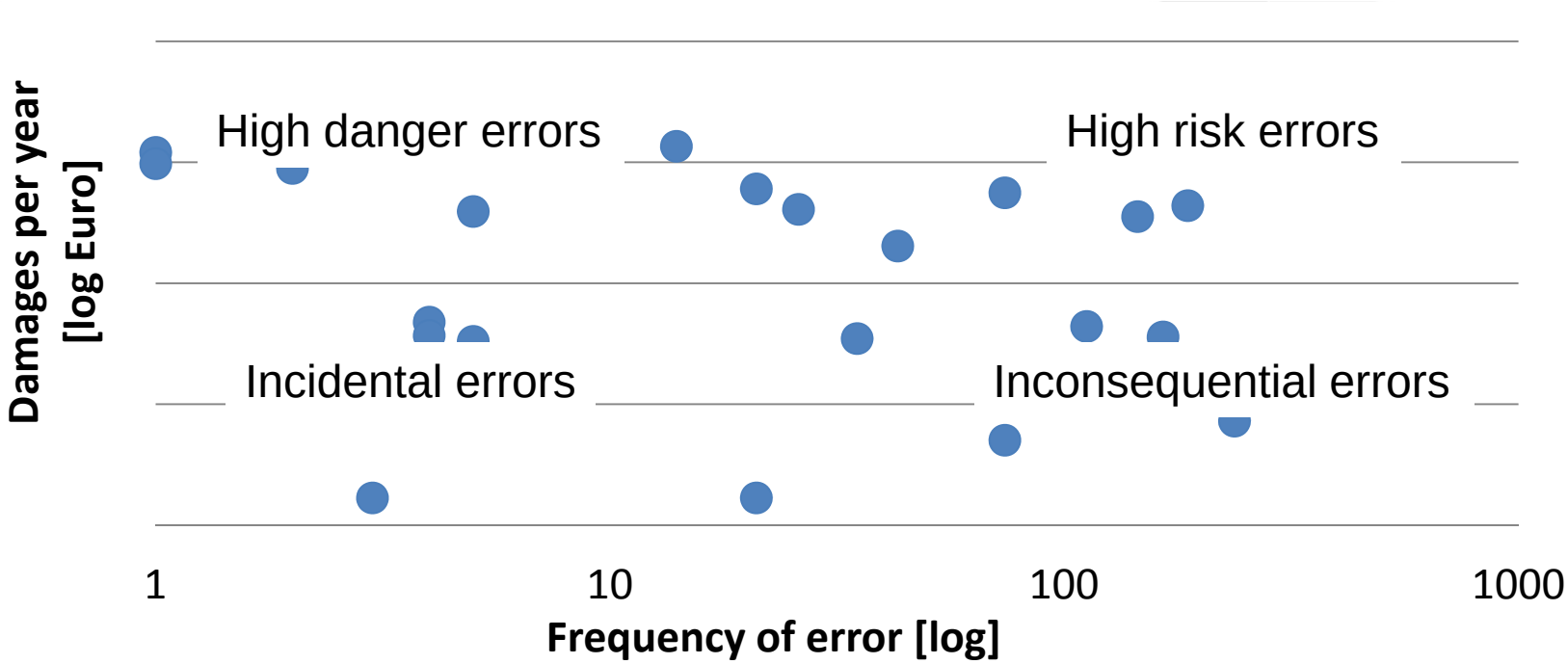
EFFECT OF BAD WEATHER





Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

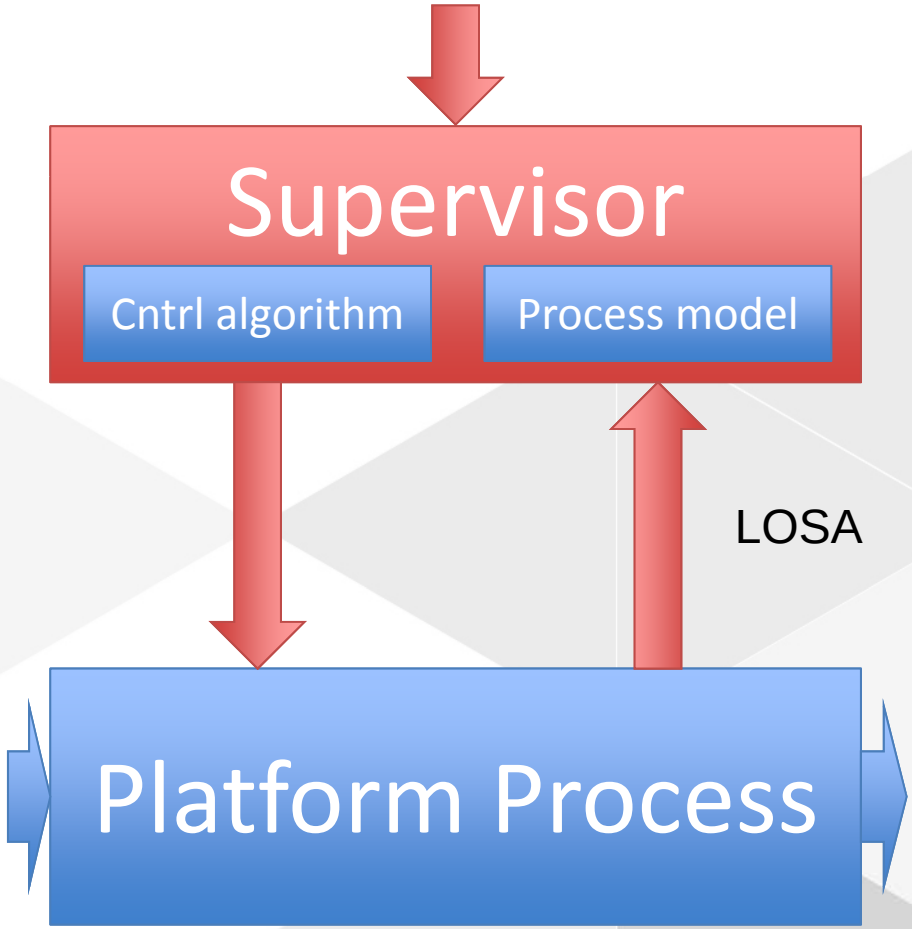
RELATION BETWEEN ERROR FREQUENCY AND DAMAGES



Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

NEXT STEPS

LOSA HAS CLOSED THE FEEDBACK LOOP AND IDENTIFIED PRELIMINARY RISKS



(Leveson 2011)

WHAT TO IMPROVE? (1/2)

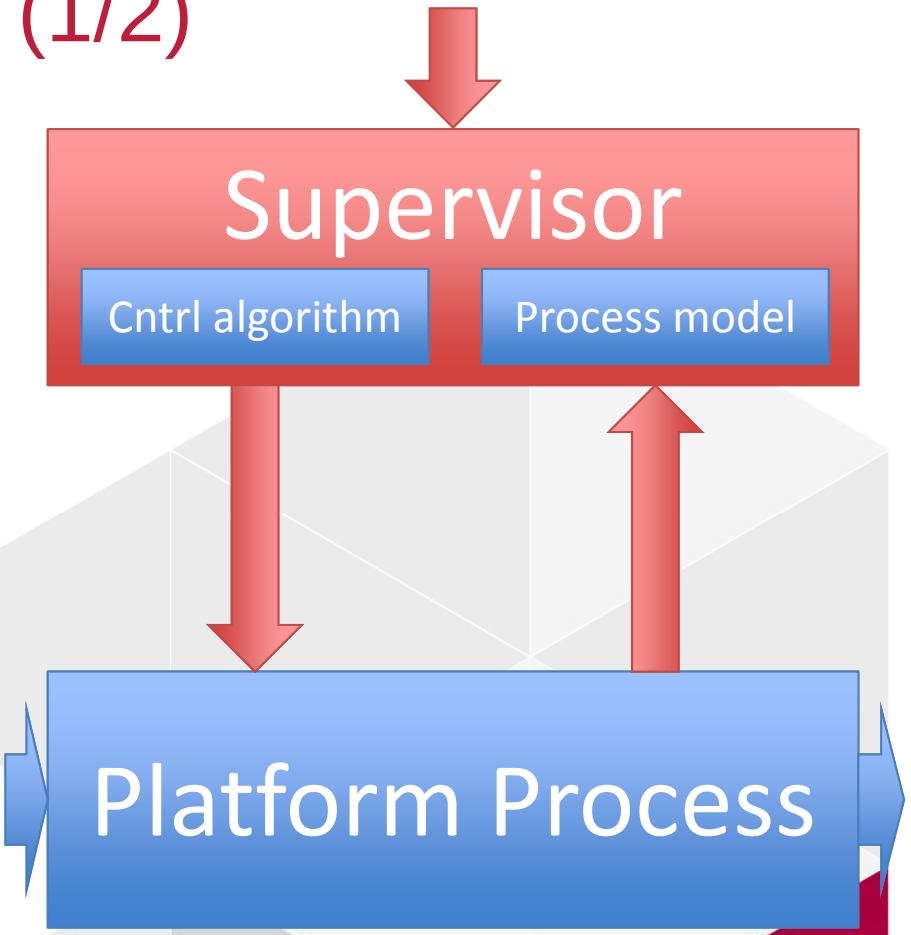
Potential Management Control Flaws

- Control input or external information wrong or missing
- Process model inconsistent, incomplete or incorrect
- Incorrect or no feedback, measurement inaccuracy, delay
- Inadequate control algorithm
- Inappropriate, ineffective, delayed or missing control action
- Conflicting control action

Platform execution

- Process failures, changes over time
- Unidentified or out-of-range disturbances

(Leveson 2011)

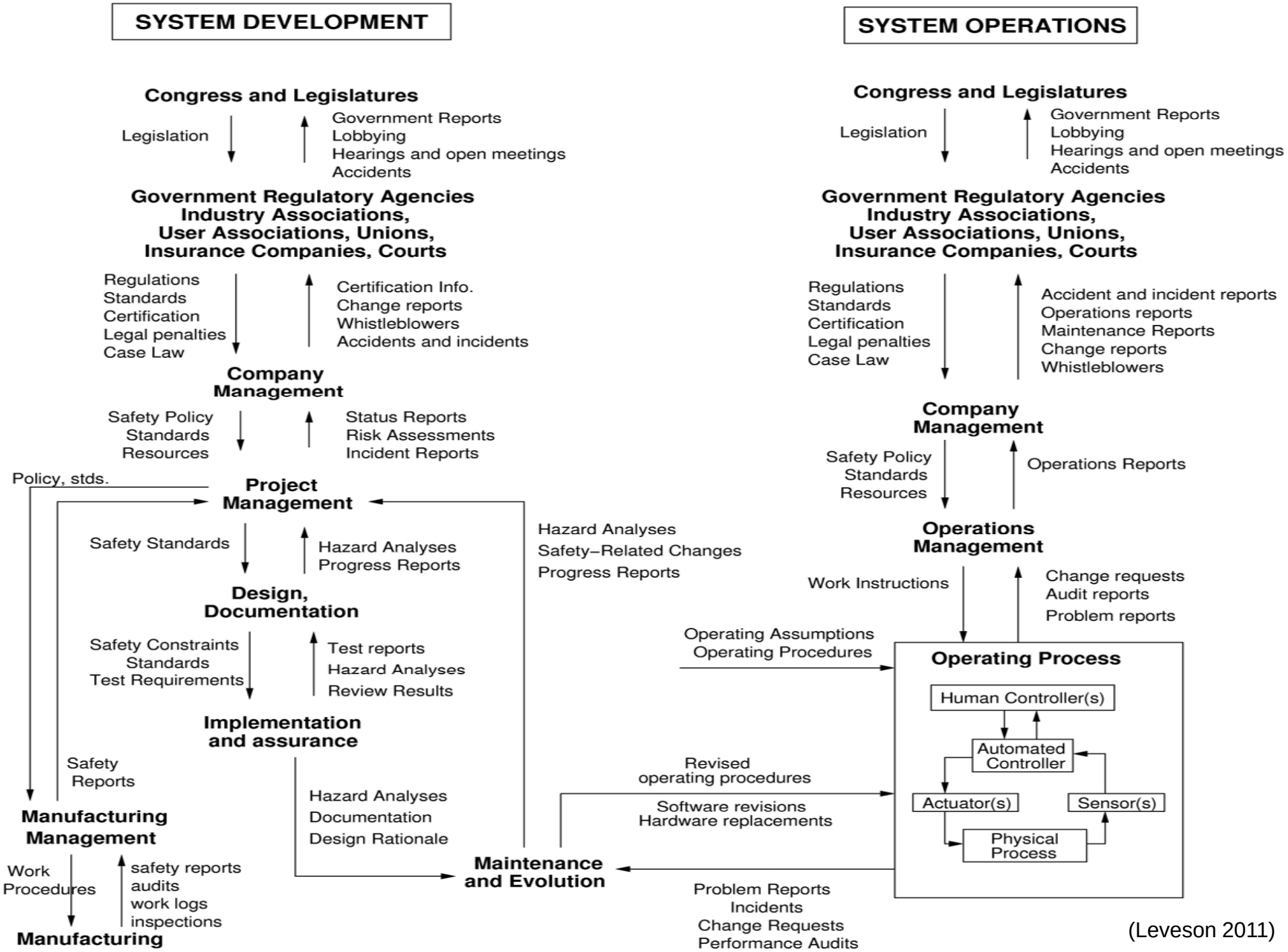


WHAT TO IMPROVE? (2/2)

Generic management tasks

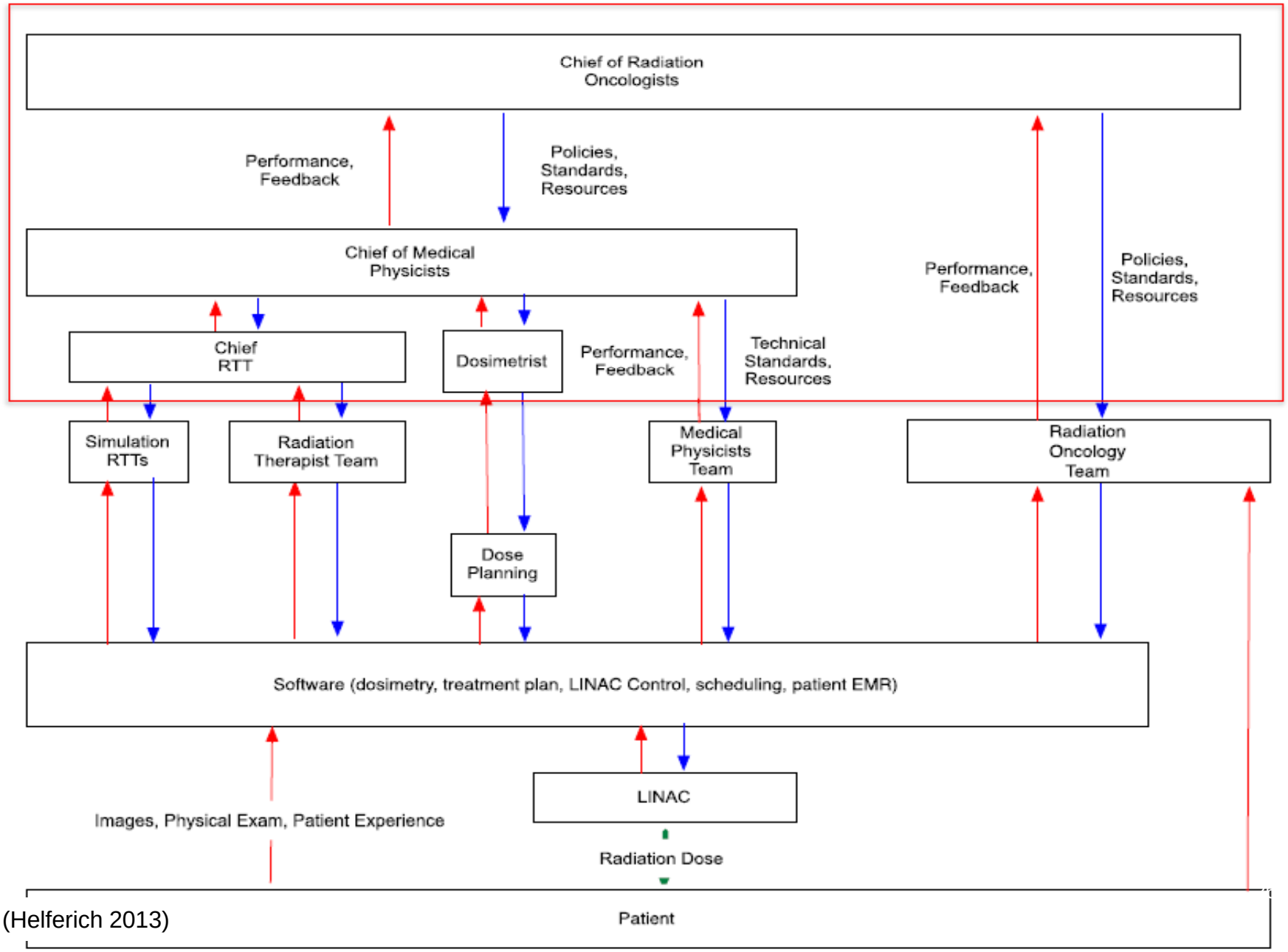
- Set goals and direction
- Establish work processes and standards
- Staff, schedule and train
- Manage facility & equipment
- Allocate resources
- Monitor, evaluate performance

(Helferich 2013)



(Leveson 2011)

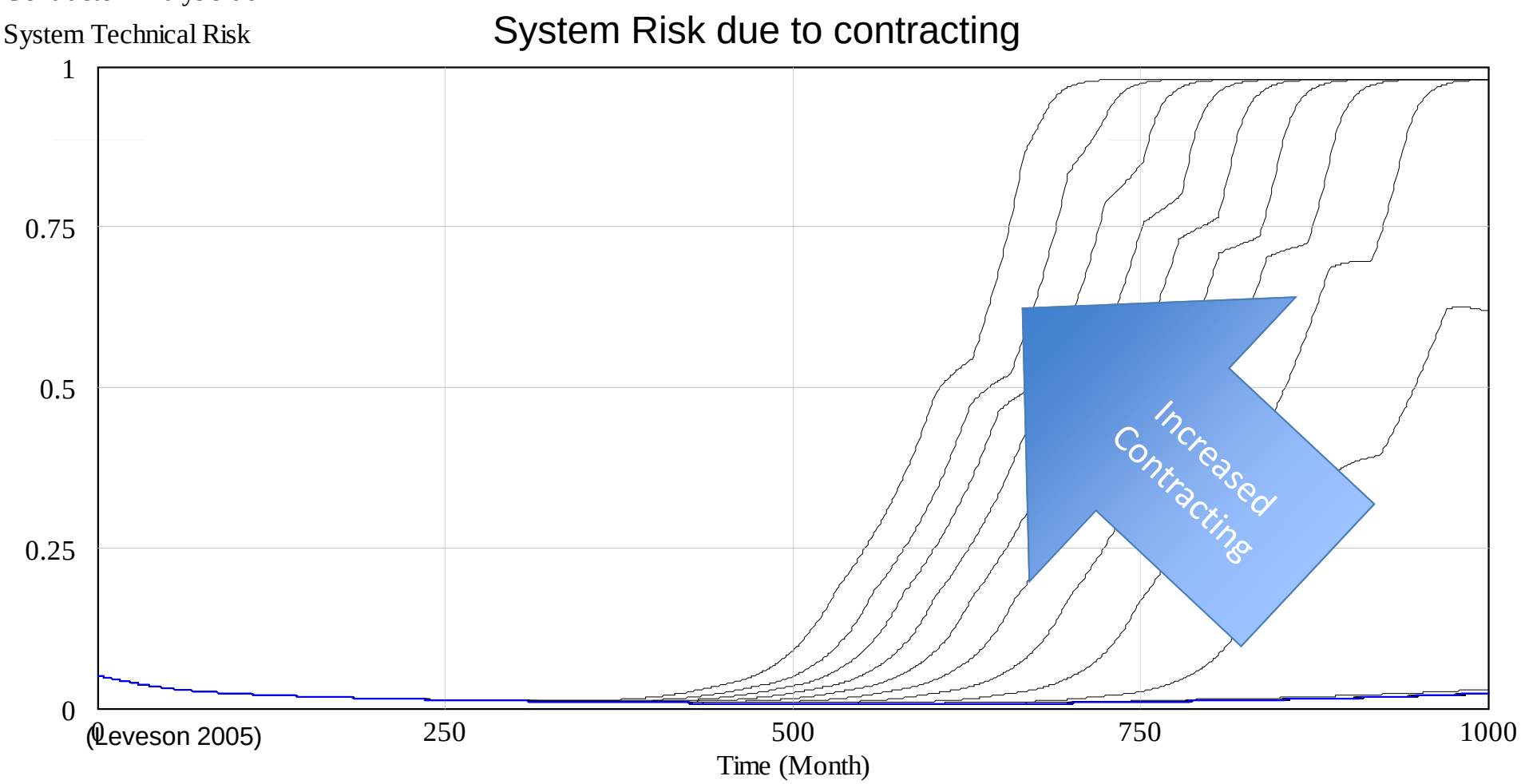
Control Structure for Radiation Oncology at UCSD



(Helferich 2013)

Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

INTRODUCING TIME – DEPENDENCY: EXAMPLE OF SD MODEL FOR NASA



(Leveson 2005)

MAP KLM–GS AGAINST "MODEL OF SOCIO-TECHNICAL SAFETY CONTROL"

- ✓ Preliminary Risk Analysis
1. Model Control Structure
2. Map requirements to responsibilities
3. Risk analysis due to control flaws
4. Categorize risks (long term, short term)
5. Dynamic analysis using System Dynamics
6. Recommendations

(Leveson 2011)

CONCLUSIONS

CONCLUSION

- Standard ramp LOSA methodology shows some weaknesses:
  - questionable threat and error management framework
  - elaborate forms
  - inflexible software
- Standard error codes are necessarily generic, need customization
- Ramp LOSA useful to quantify safety performance at the bottom of the iceberg
- Improvements require interventions at the supervisor level
- We expect effective interventions to be identified through a systems approach to identify control flaws
  - Part of an integrated research program at the Amsterdam Univ. of AS.

Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

THANK YOU FOR YOUR ATTENTION

Robert J. de Boer: rj.de.boer@hva.nl
Leandros Kappos: leandroskappos@gmail.com