

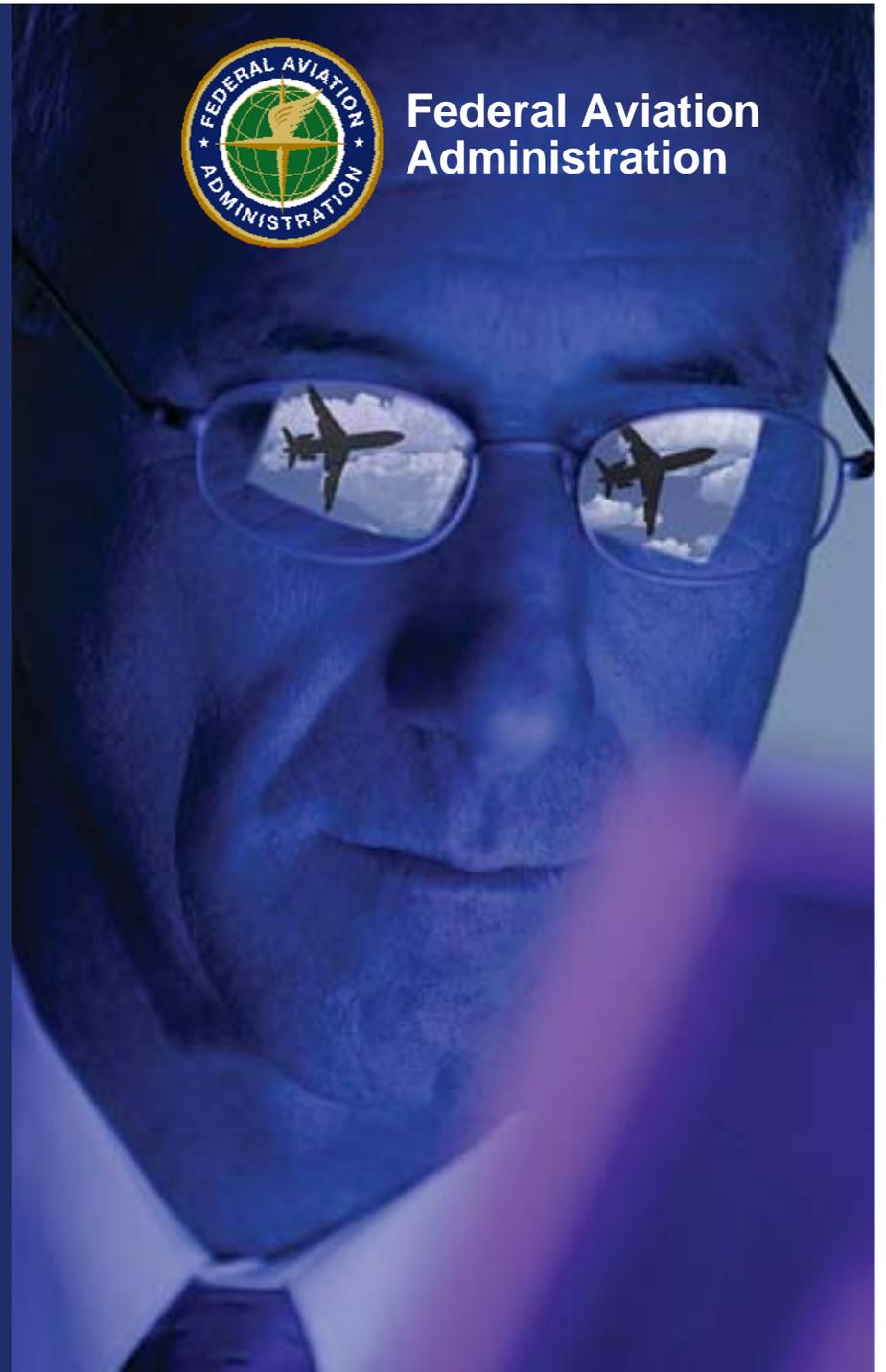
A Survey of Human Factors in International Maintenance Organizations

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JAA Human Factors Working Group
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**Federal Aviation
Administration**



Agenda

The Survey

2006 and Future FAA maintenance HF Activities



Survey Goals and Methods

- **Purpose:** Assess international status of maintenance HF
- **Look at:** HF programs, fatigue management, error management, and training.
- **Comparison:** Compare by regulators
- **Distribution:** Online survey (80 items) to 630 addresses.

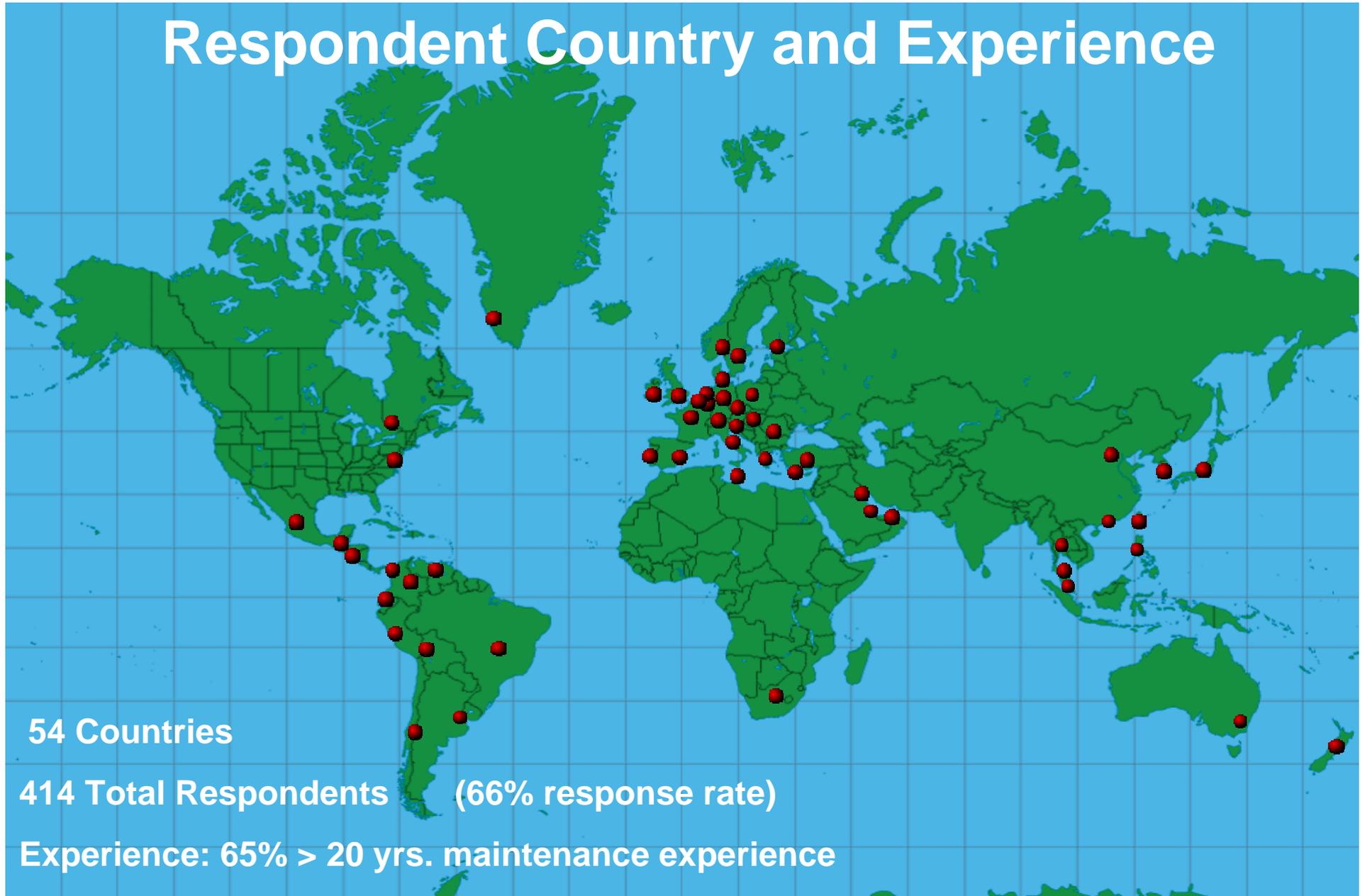


Summary Findings

- Transport Canada and EASA countries have most robust programs.
- Strong regulations promote strong HF programs.
- Fatigue issues are perceived to be important but little action.
- When companies have programs they are similar.



Respondent Country and Experience



54 Countries

414 Total Respondents (66% response rate)

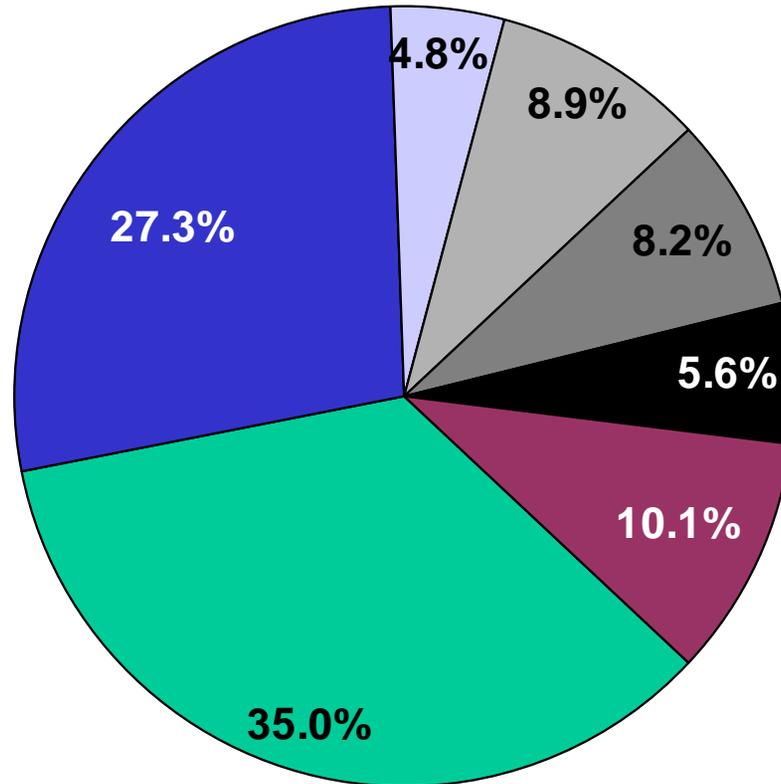
Experience: 65% > 20 yrs. maintenance experience



Responding Countries

Argentina 4	Greece 10	Peru 1
Australia 19	Greenland 1	Philippines 4
Austria 1	Guatemala 2	Poland 1
Bahrain 1	Hong Kong 6	Portugal 2
Belgium 3	Hungary 1	Romania 1
Bolivia 3	Ireland 2	Singapore 12
Brazil 3	Italy 1	Slovenia 1
Canada 36	Japan 3	South Africa 5
Chile 3	Korea 2	Spain 8
China 3	Kuwait 1	Sweden 4
Columbia 3	Luxembourg 1	Switzerland 4
Cyprus 1	Malaysia 6	Taiwan 9
Denmark 1	Malta 1	Thailand 1
Ecuador 1	Mexico 4	Turkey 1
El Salvador 1	Netherlands 2	United Arab Emirates 3
Finland 1	New Zealand 3	United Kingdom 29
France 3	Norway 12	United States 160
Germany 6	Panama 4	Venezuela 3

Where do you work?



Airline
GA/BIZ
Other

Repair Stn
Mil/Govt

Manufacturer
School/Trn



What type of Airline Organization?

Major Carrier	65.8%
Regional Carrier	20.6%
Air Taxi/Charter	7.9%
Corporate	5.7%



Respondent Demographics

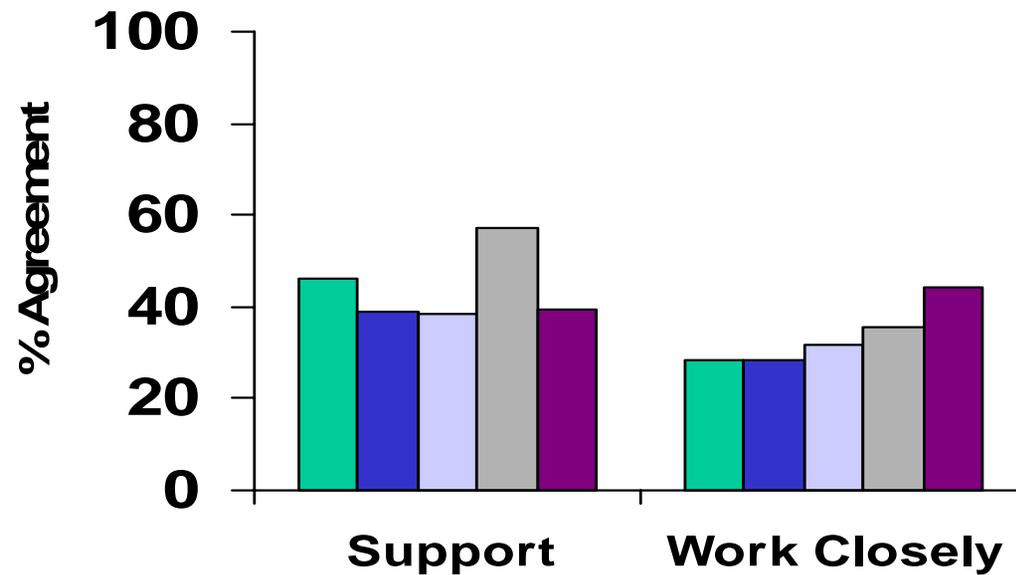
Job Title	% of Respondents
HF Manager	7.6%
Quality VP/Director/Manager	24.1%
Maintenance VP/Director/Manager	19%
HF Trainer	8.1%
Labor	3%
Other	38.1%

3. Who is your Regulator? (N=404)

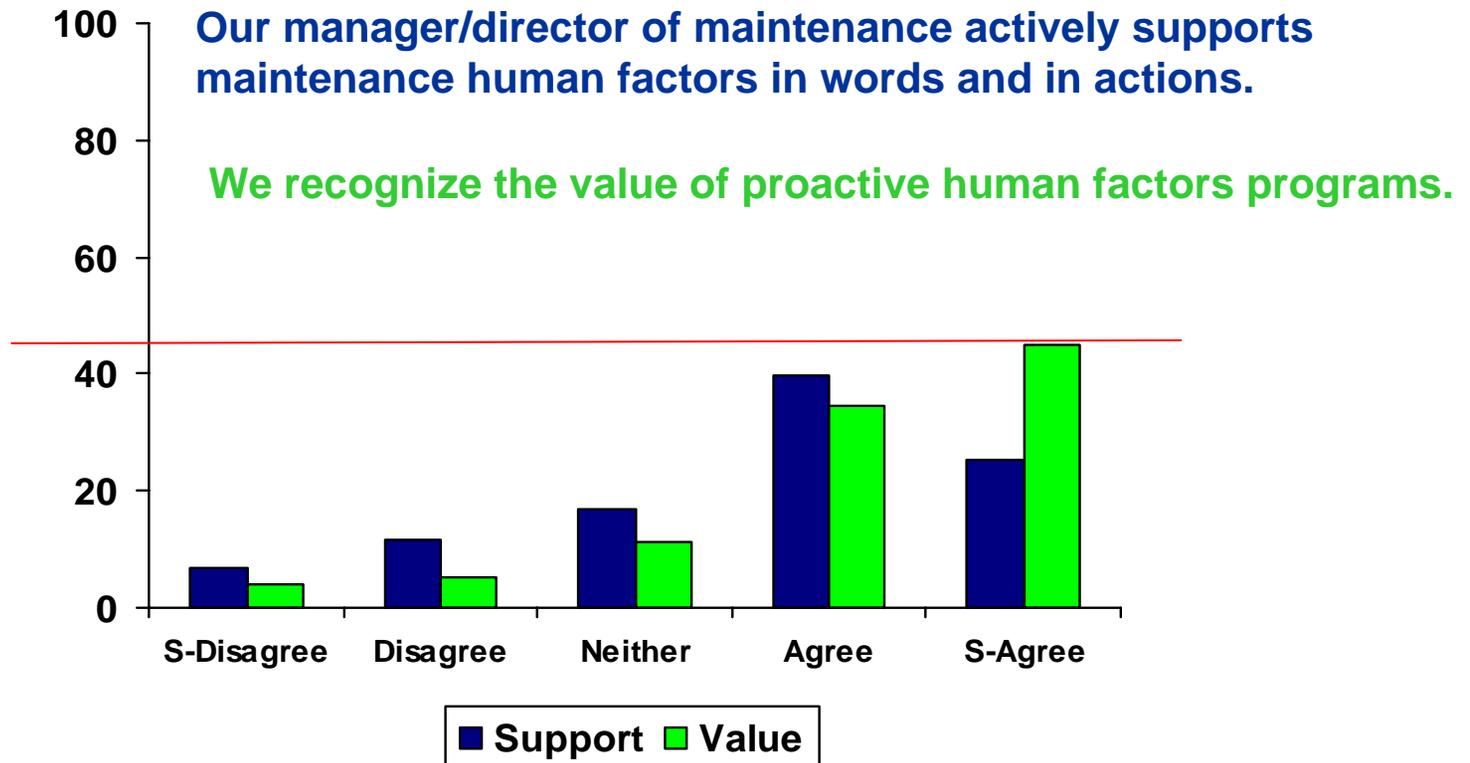
Civil Aviation Safety Authority (CASA) N=19	4.7%
European Aviation Safety Agency (EASA) N=95	23.5%
Federal Aviation Administration (FAA) N=182	45%
Transport Canada N=36	8.9%
Other National Aviation Authority N=72	17.8%



Regulatory Support and Close Work



Management Support

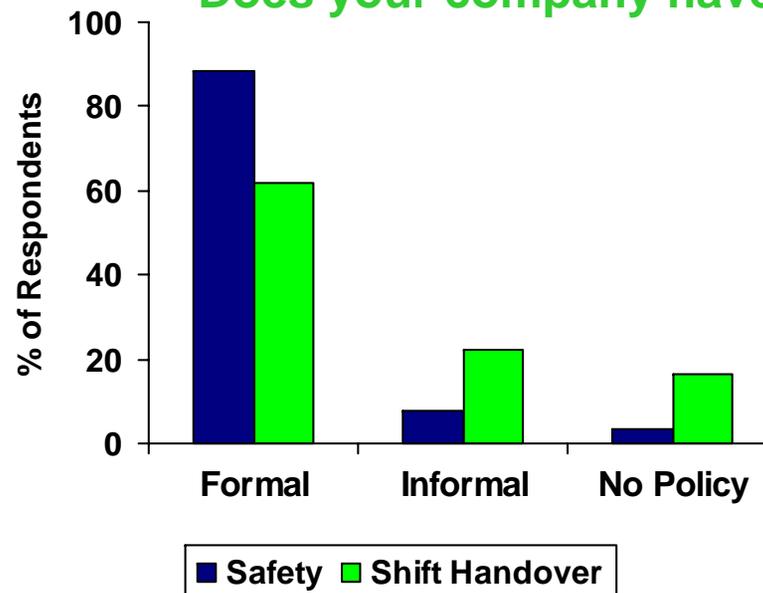


However, only 11.5% indicated HF was an explicit line item in their company's budget.

HF Program Elements: Organizational Policies

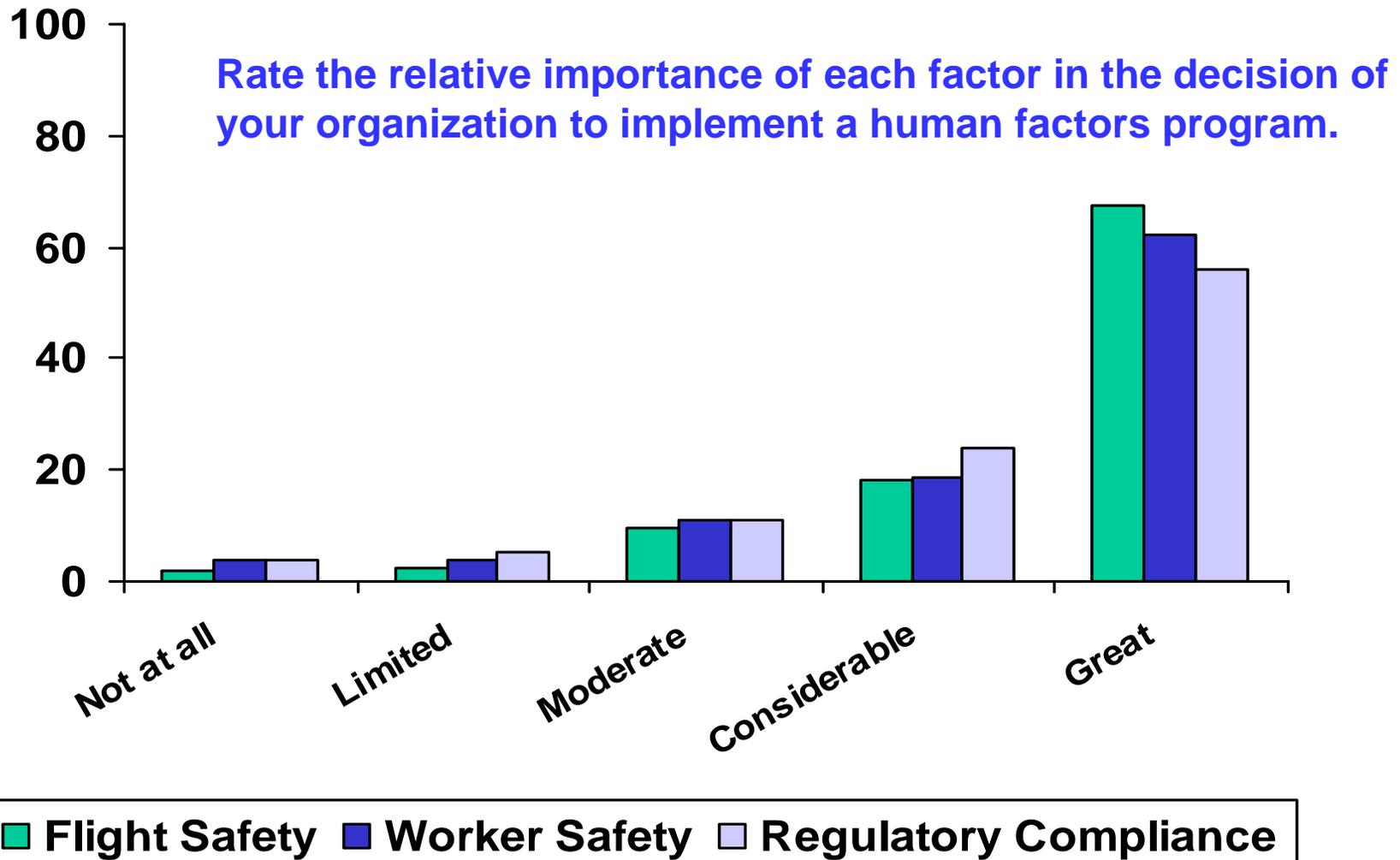
Does your company have a safety policy?

Does your company have a shift handover policy?

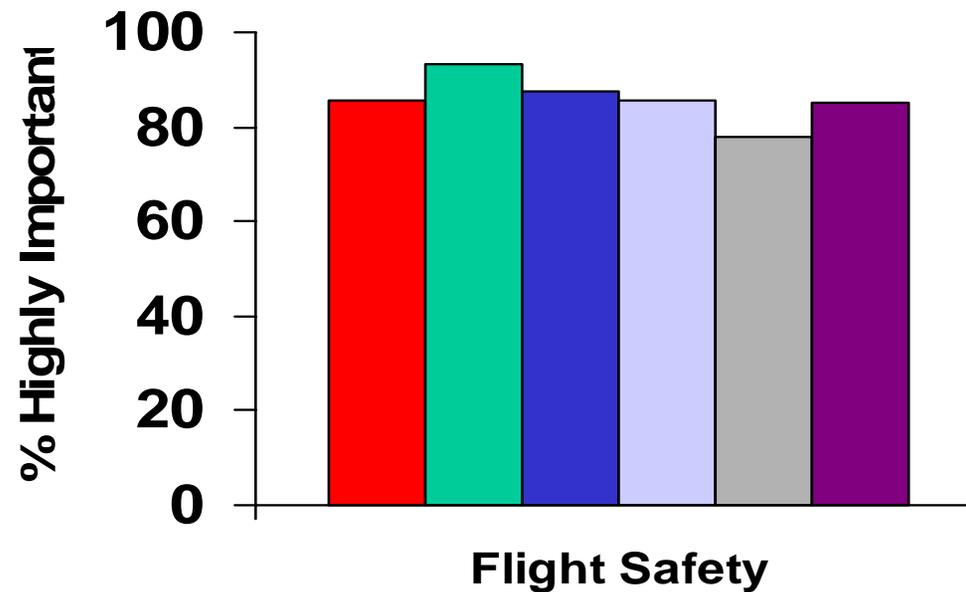


72.3% have a formal quality assurance process like ISO9000 or a continuous improvement program.

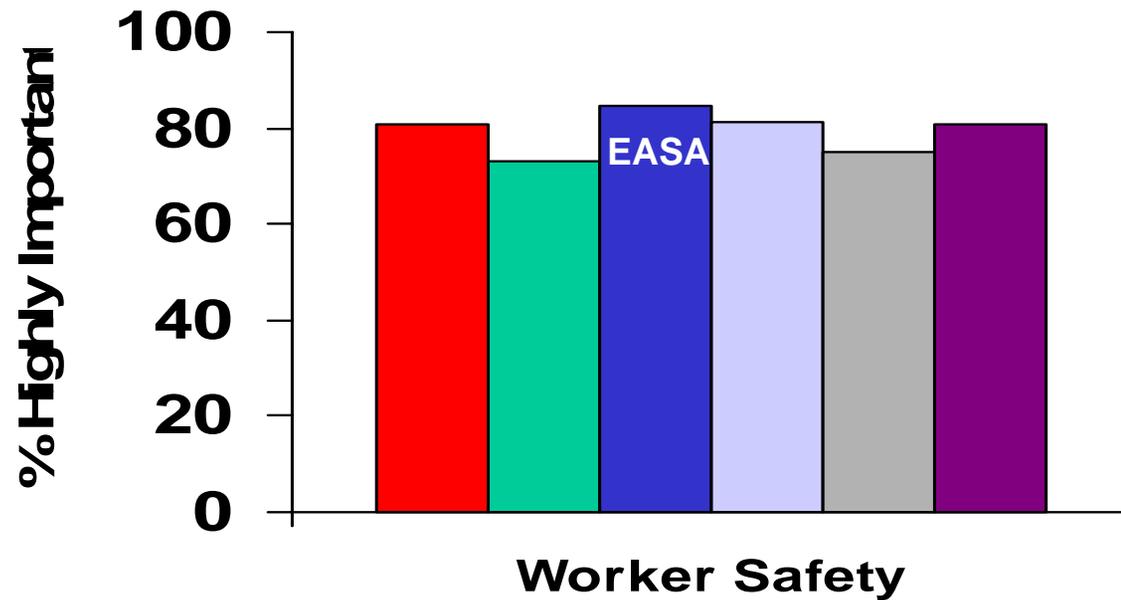
45.- 48. Motivation for HF Program is Safety



46. Importance of Flight Safety to Motivate HF Programs

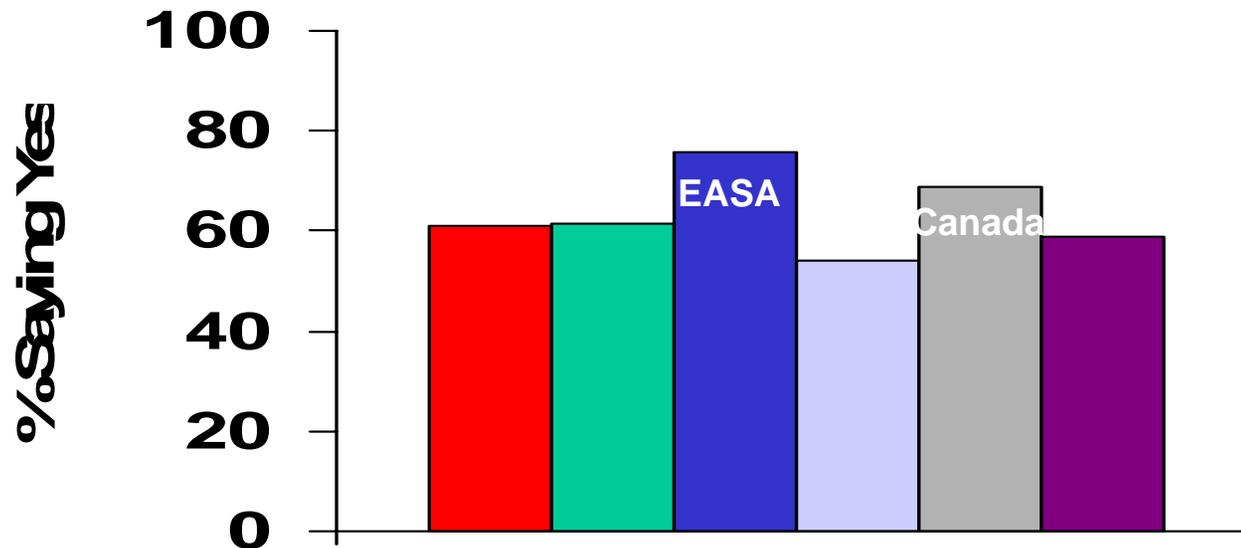


47. Importance of Worker Safety

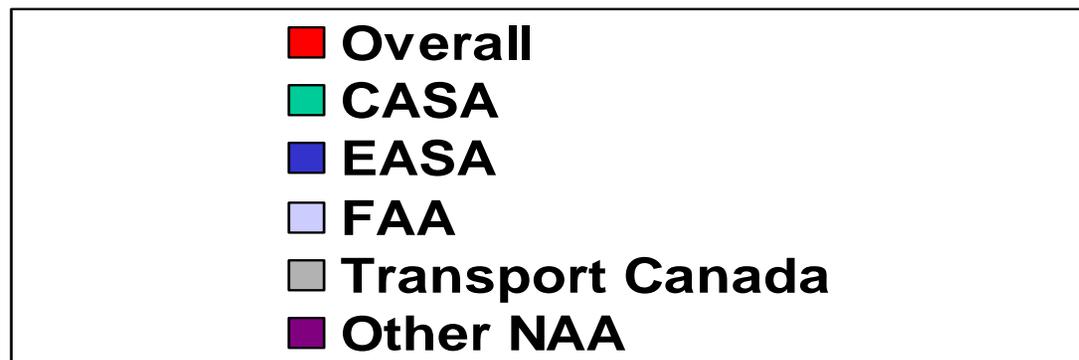
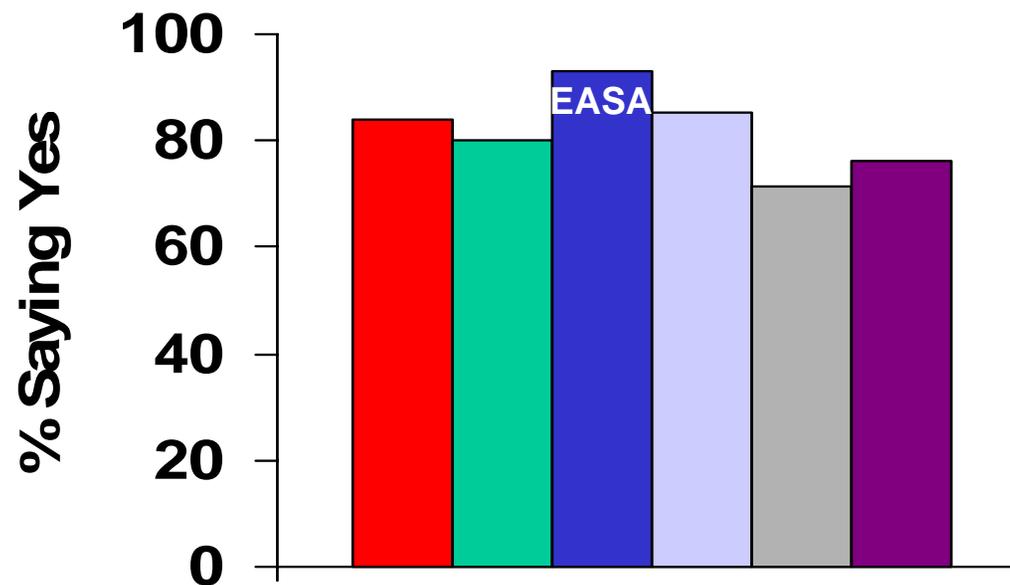


- Average
- CASA
- EASA
- FAA
- Transport Canada
- Other NAA

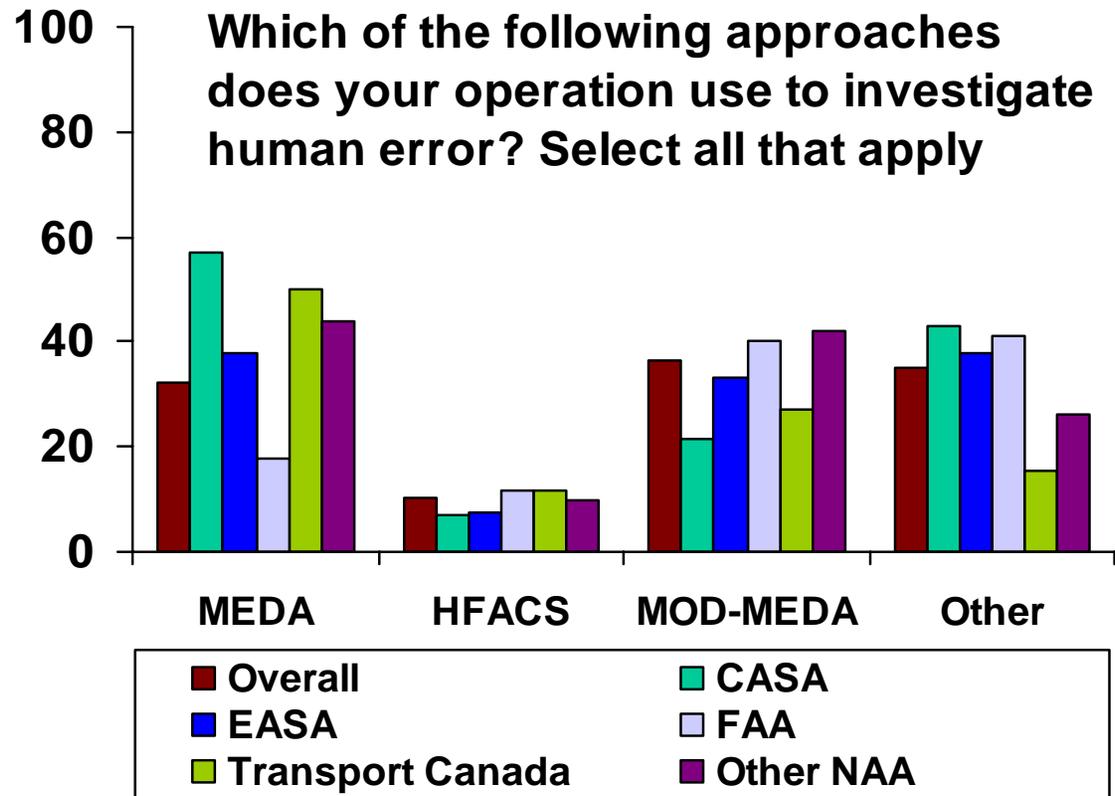
12. Do you have written disciplinary policy?



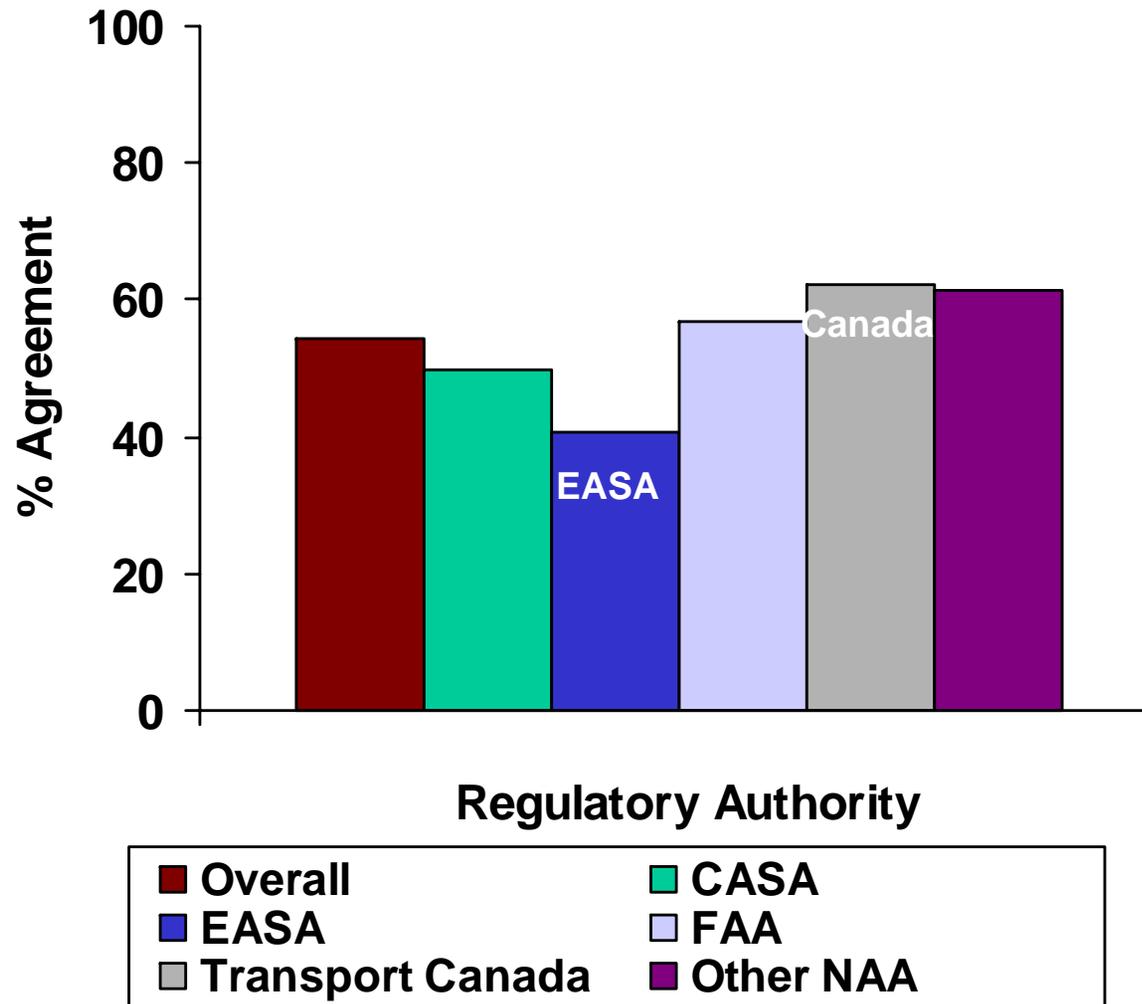
51. Do you have formal shift turnover policy.



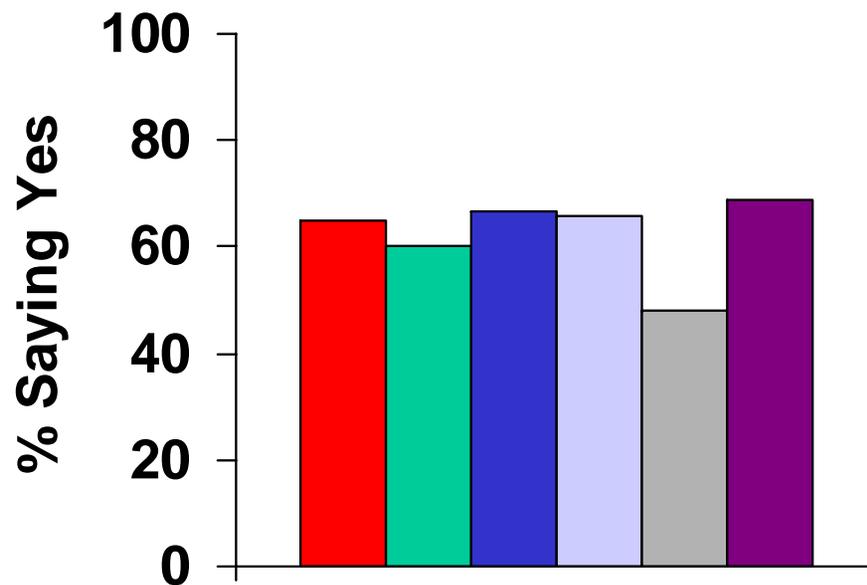
HF Program Elements: Error Management



Measuring the Economic Effect of Errors

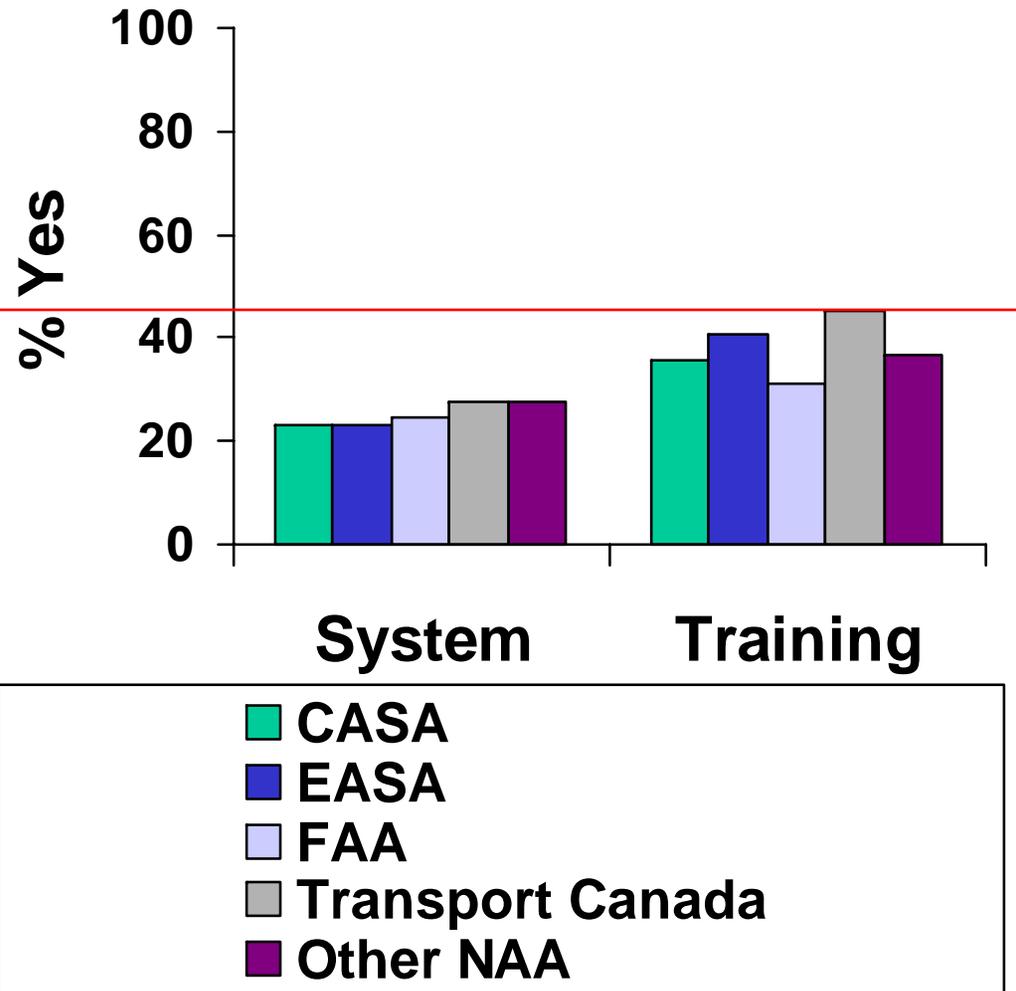


59. Do you check that suppliers have a QA program?

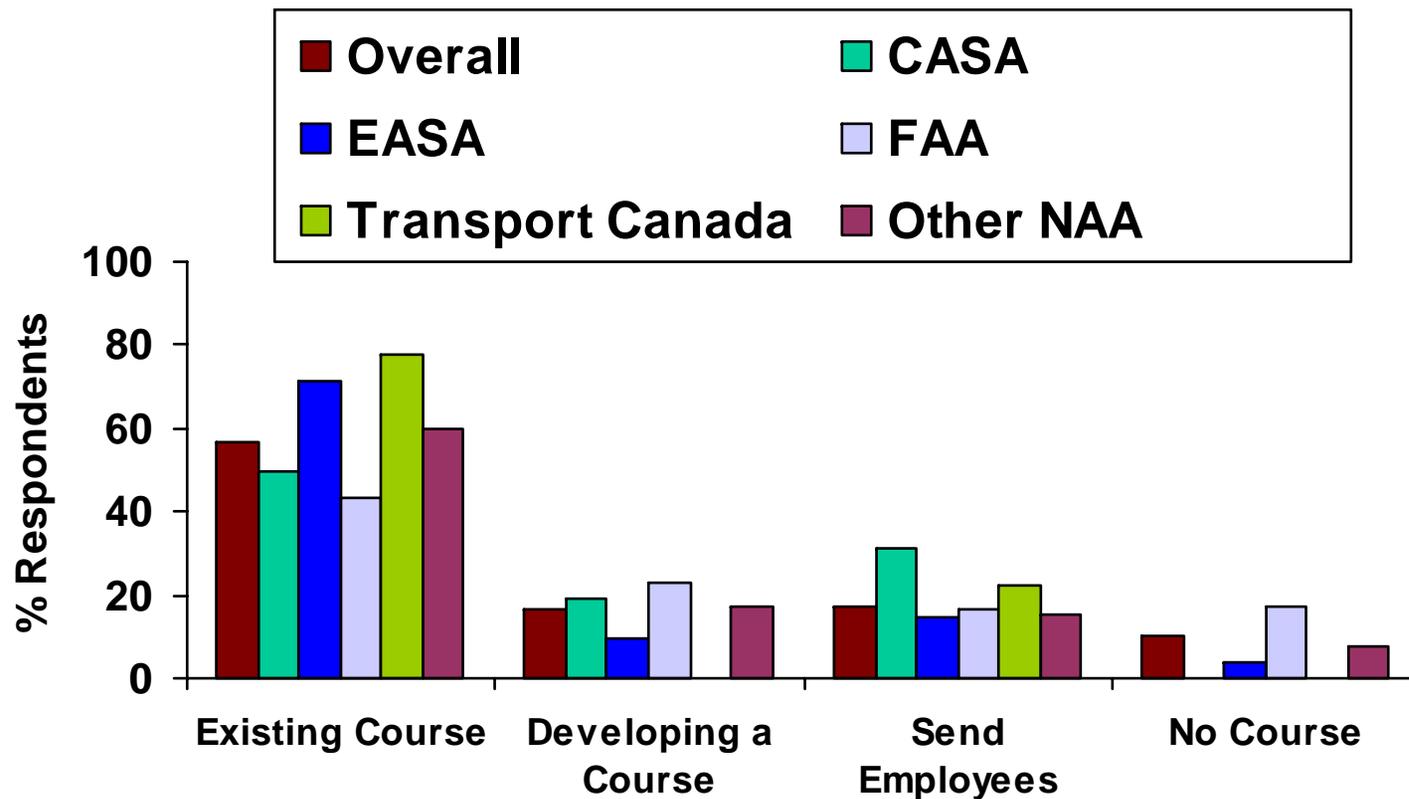


HF Program Elements: Fatigue Management

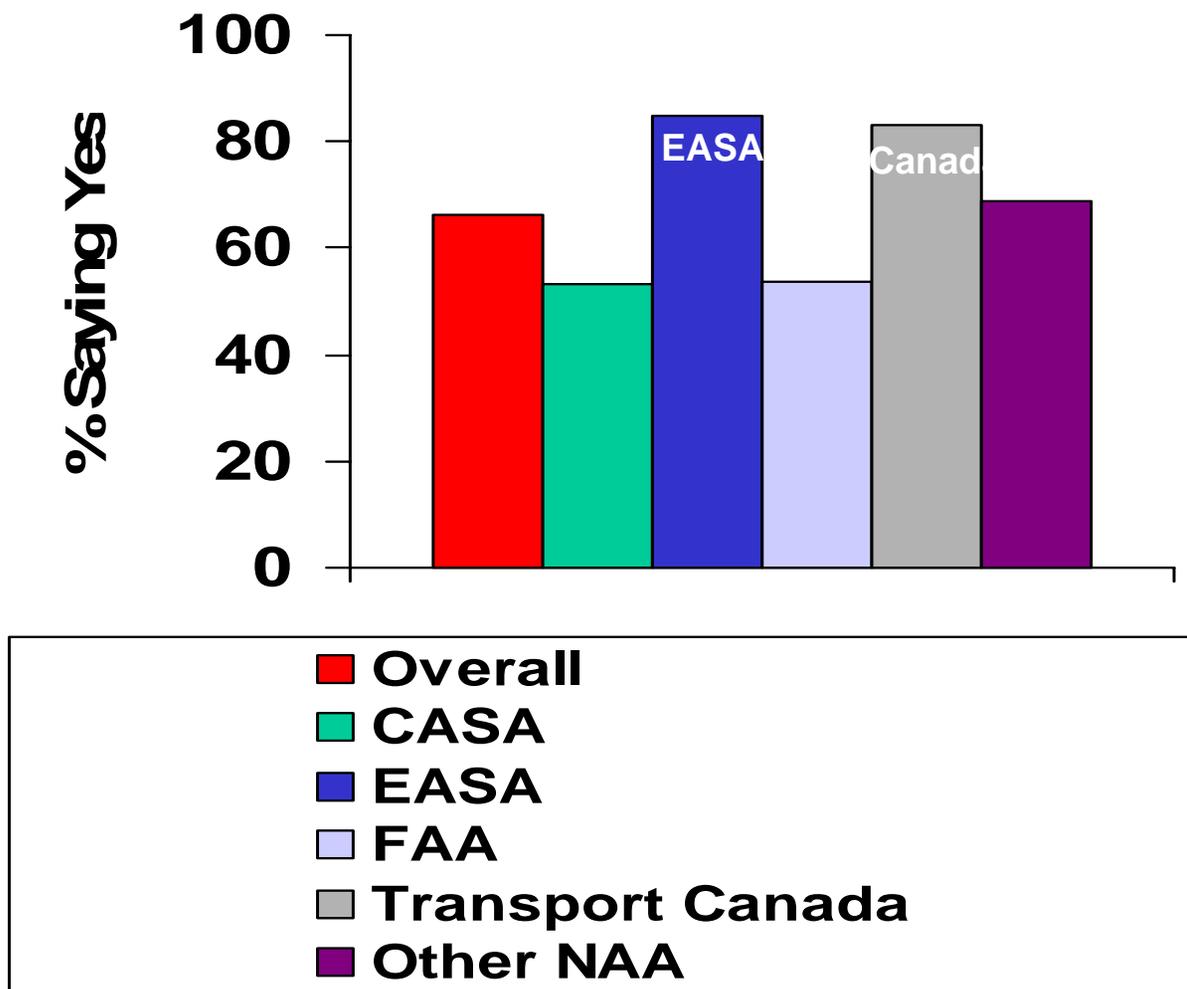
- 82% said fatigue was an issue.
- 25% had Fatigue Management Systems.
- 36% had Training on Fatigue Management



Canada and EASA have the most HF Training



21. Do you offer continuation training to maintenance personnel?

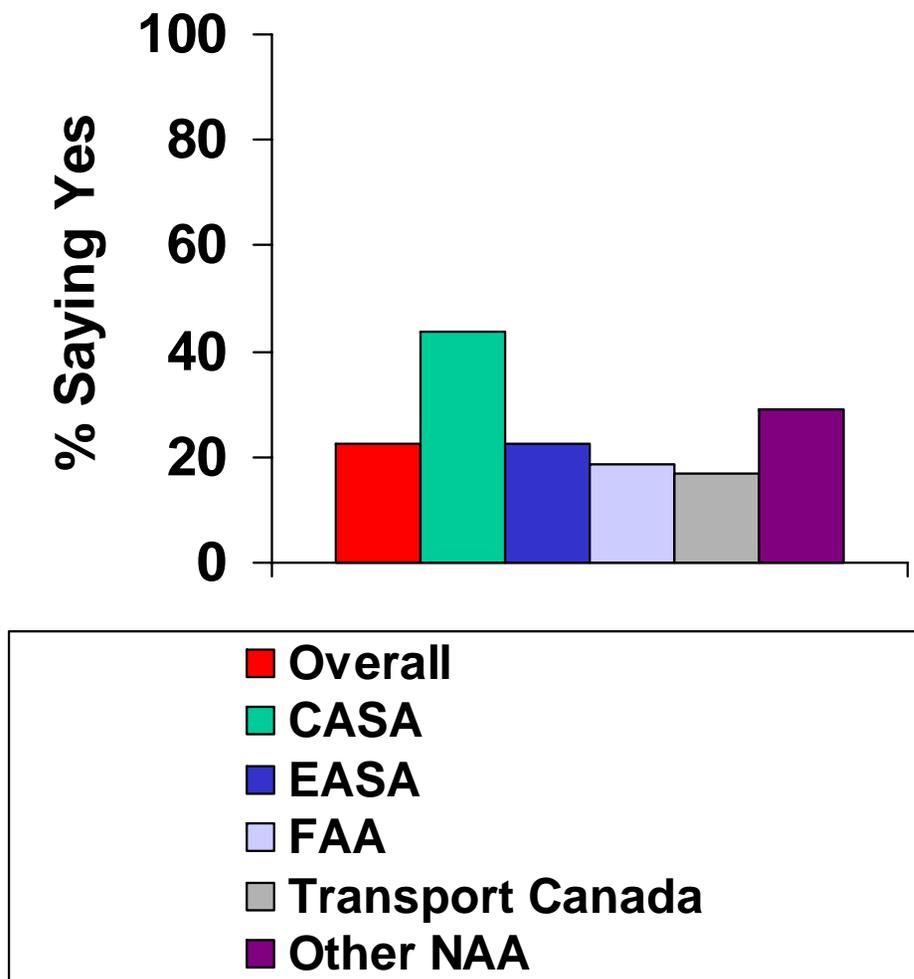


Topic Areas of Human Factors Course

<i>Introduction to HF</i>	96.4%
<i>Effect of Shift Work and Fatigue on Performance</i>	89.8%
<i>Communications (e.g., Inter-team, Crew Resource Management)</i>	92.4%
<i>Factors that Contribute to Human Error</i>	96%
<i>Event Investigation</i>	74.7%
<i>Shift Turnover</i>	78.2%
<i>Other Topic</i>	32.9%



17. Does your HF person have academic degree in HF or related



32. What kind of HF Training for Instructors?

<i>Academic Degree in HF or Related Field</i>	16.3%
<i>University Diploma</i>	39%
<i>Attended short course in HF</i>	61%
<i>Attended short course on HF Instructor Training</i>	46.8%
<i>Maintenance Work Experience</i>	68.5%
<i>Licensed Mechanic/Engineer</i>	48.5%
<i>No formal training</i>	12.9%

Discussion

- **Worker safety, flight safety, regulatory compliance are important motivators when implementing an HF program.**
- **Strong Regs. Make strong programs.**
- **Not a wide variance in existence programs.**
- **Fatigue may be an international issue.**
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Necessary Analyses Remaining

- Compare answers by job title
- Break out UK CAA
- Statistical analyses of differences
- Complete written report



Agenda

The Survey

2006 and Future FAA Maintenance HF Activities



Selected 2005 Activity

- *The Operator's Manual for Human Factors in Aviation Maintenance* (www.hf.faa.gov/opsmanual)
 - Plain Language Award
 - Published in 3 Languages
 - Widely – adopted by industry
 - Many website hits with document downloads 4000+
- Support of FAR 145 Rule with Guidance Material
- Study of language-related error in maintenance



Language Error Study

1000 participants: Asia, Latin America, Europe and US.



Main Findings

- Language errors exist but typically found early
- High Accuracy everywhere: Non-native English speakers go slower but maintain accuracy

Main Recommendations

- Deliver more specialized language training.
- Provide and translation (full & partial).

Selected 2006 Activity

- **International Conference (ATA)**
September 4- 6, 2007 Orlando (www.airlines.org)



- **Unmanned Aerial Systems (NASA)**



- **International Survey on HF in Maintenance (CAMI)**

More 2006 Activity

- **Web-Based Surveillance and Auditing Tool (WebSAT)**



- **Revised Training Course for FAA Inspectors**

2 Days  3 Days
Highly Revised!

Additional Selected 2006 Activity

- Rewrite of “*Human Factors Guide for Maintenance and Inspection.*”
- Revive “hfskyway.faa.gov”
- AFS Mx Human Factors Plan



Challenges

- **Maintenance HF Regulations: 65, 121, 135,145, 147.**
- **Survey of Maintenance Human Factors Issues for US FAA Inspectors**
- **Fatigue R&D? Guidance? Regulation?**
- **Advanced Technologies, VLJs, Rotorcraft, UAVs, Avionics, Commercial Space travel, Aging Aircraft,**
- **Ensuring Quality & Safety in all Maintenance Organizations**

More Challenges

- **General Aviation Maintenance HF**
- **SMS in Maintenance**
- **Future qualifications of the aviation mechanic/engineer**
- **Evolve Flight Standards MX HF Plan to Office of Aviation Safety Plan**



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The Survey

2006 and Future FAA maintenance HF Activities

Thank you

