

9 July 2010

## Science System Assessment



# Leadership and management of high-performing research groups

# Research question

9 July 2010

Science System Assessment

*Do leaders of high-performing research groups differ in their leadership and management approach?*



# Performance of research groups

9 July 2010

Science System Assessment

Performance of research groups is mostly assessed by publication and citation scores or peer review.

We state that **leadership and management** are important aspects of quality.



# High-performing research groups

9 July 2010

Science System Assessment

Demonstrate excellence in different aspects of scientific academic performance:

## Impact: high output

- high publication counts (quantity)
- high citation counts (visibility)

## Efficiency: normalized output

- many publications per group member (productivity)
- many citations per publication (relative visibility)

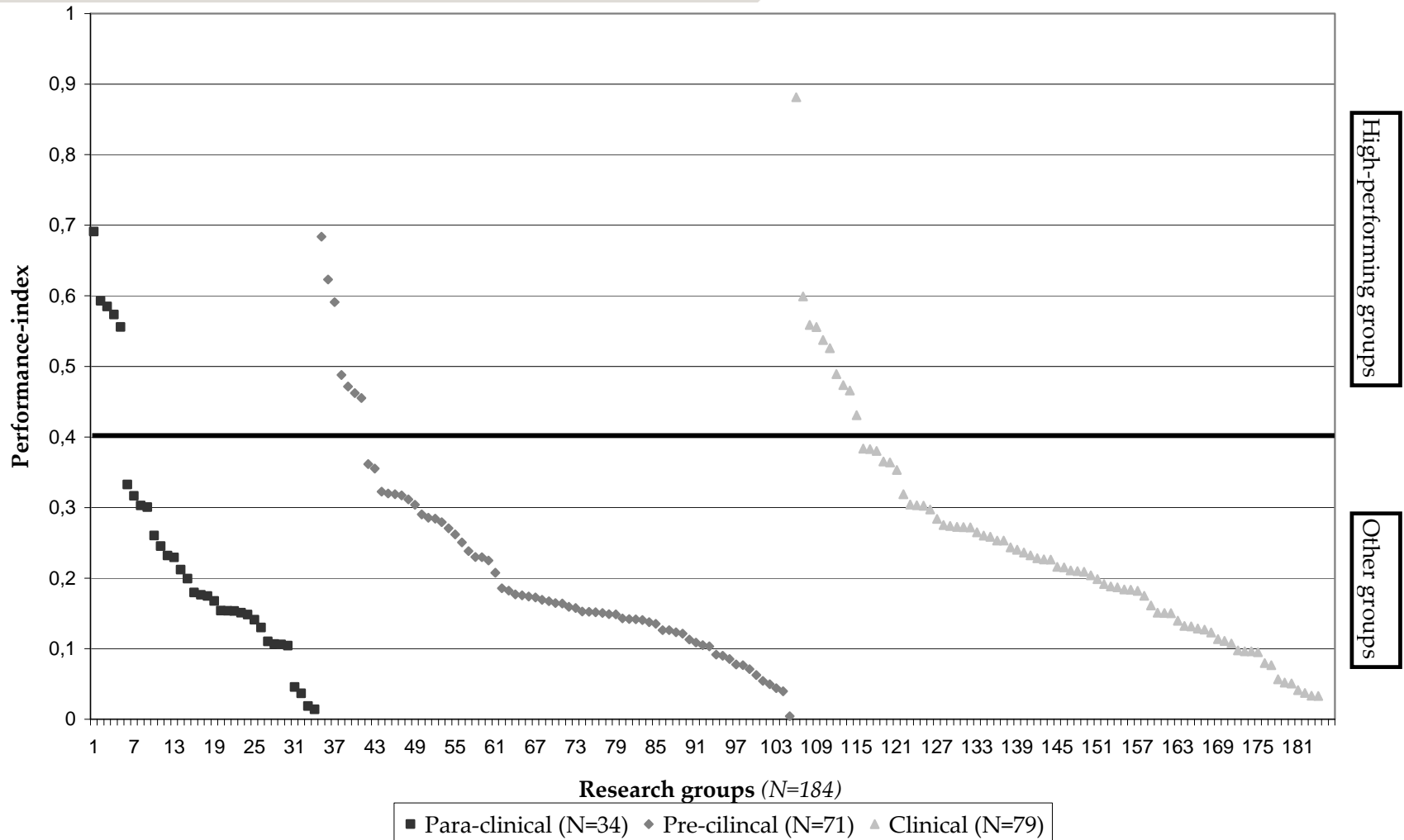


184 respondents: 22 high-performing groups

# Performance-index

9 July 2010

## Science System Assessment



# Survey: management style



Rathenau Instituut

9 July 2010

Science System Assessment

- Time allocation

research, education, supervision, management and patient care

- Research orientation

“I feel more like a researcher than a manager”

- Setting the research agenda

continuity, innovative, international interest, PhDs, application, visibility

- Personal characteristics

gender, age and years of experience as group leader

# Survey: management activities



Rathenau Instituut

9 July 2010

Science System Assessment

- Research communication  
internal research presentations
- Reward system  
immaterial rewards by special honours and non-financial prizes
- Quality system  
pre-evaluations of research proposals

# Survey: group contingencies



Rathenau Instituut

9 July 2010

Science System Assessment

- Funding source

institutional funding, research councils, commissioned research by industry/government, charities, EU funds

- Size and group composition

professors, senior and junior researchers and support staff

Method: Analysis of variance (ANOVA)

# High-performing research groups...



Rathenau Instituut

9 July 2010

Science System Assessment

... have group leaders that:

1. have a more diverse leadership and management style
2. a more research oriented leadership and management style
3. are more dedicated to leadership and management activities



# More diverse leadership & management style



Rathenau Instituut

9 July 2010

## Science System Assessment

	High	Other	ANOVA
<b>Number of tasks</b>	6.27	5.98	$F(1,182)=2.840, p=0.094$
<b>Coefficient of variation for time allocation (<math>C_v=\sigma / \mu, \mu=100\% / \text{tasks}</math>)</b>	0.728	0.878	$F(1,182)=6.057, p=0.015$
	High	Other	ANOVA
<b>Strategic considerations (mean value over 8 considerations)</b>	3.6	3.4	$F(1,181)=4.810, p=0.030$
<b>Number of funding sources</b>	4.4	3.6	$F(1,173)=4.840, p=0.029$

# More diverse leadership & management style

9 July 2010

Science System Assessment

1. A more evenly distributed time allocation
2. A broader strategic consideration for setting the research agenda
3. Obtain funding from more various sources



# More research oriented

9 July 2010

## Science System Assessment

	High	Other	ANOVA
Research commitment	4.4	4.1	$F(1,182)=8.415, p=0.004$
First author publications	3.4	2.9	$F(1,182)=3.304, p=0.071$

Discipline	Task	High	Other	ANOVA
Para-clinical	Research activities	20.9%	15.8%	$F(1,32) = 1.620, p = .21$
	Patient care	1.3%	9.3%	$F(1,32) = 1.099, p = .30$
Clinical	Research activities	17.9%	14.5%	$F(1,77) = 1.298, p = .26$
	Experiments/analyses	10.0%	6.5%	$F(1,77) = 2.274, p = .14$
	Patient care	14.6%	23.9%	$F(1,77) = 1.901, p = .17$
Pre-clinical	Patient care	19.0%	13.4%	$F(1,69) = 0.689, p = .41$
	Research activities	No difference		Application fundamental knowledge

Patient care is distracting task

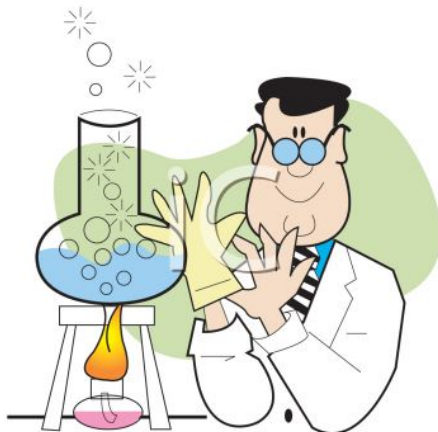
Application fundamental knowledge

# More research oriented

9 July 2010

Science System Assessment

1. Stronger committed to research of their group
2. State that they more frequently publish as first author
3. Higher proportion of time spending on research related tasks



“It is very simple, if you do not know what your people are doing then you are not a good group leader.”

# More dedicated to leadership and management activities



Rathenau Instituut

9 July 2010

## Science System Assessment

	High	Other	ANOVA
<b>Internal research presentations</b>	3.9	3.5	$F(1,182) = 7.416$ $p = 0.007$
<b>Immaterial rewards</b>	2.1	1.6	$F(1,147) = 7.911$ $p = 0.006$
<b>Quality system</b>	4.5	4.0	$F(1,147) = 7.911$ $p = 0.006$

# More dedicated to leadership and management activities

9 July 2010

Science System Assessment

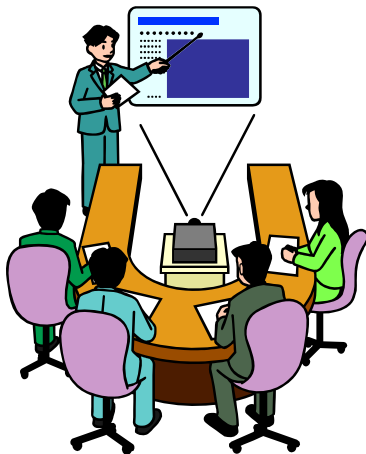
1. Organise more frequently internal research presentations
2. Use more often non-financial and special honours to reward
3. Attached a higher value to pre-evaluations of research proposals

© Original Artist

Reproduction rights obtainable from  
www.CartoonStock.com



"It's a foolproof formula for writing grant applications."



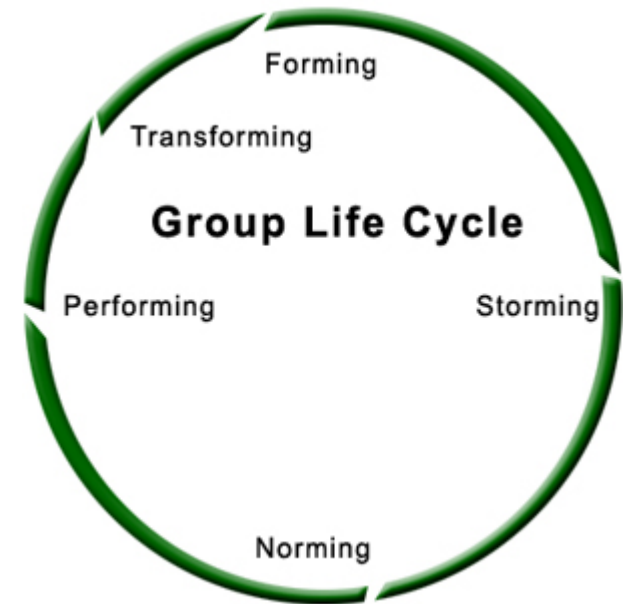


# And weak-performing research groups?

9 July 2010

Science System Assessment

- Less experience as group leader.
- Research groups in an early life stage instead of weak.
  - Less junior researchers
  - Less support staff
  - Less time on editorial activities
  - Less time on evaluation/  
governmental activities  
in funding committees.



# To summarize



Rathenau Instituut

9 July 2010

Science System Assessment

- Performance of research is more than only high output (publications and citations)...
- ...Management and leadership is an important quality indicator of research groups.
- Also necessary to take into account life cycle stage of research groups.

# Thank you for your attention!

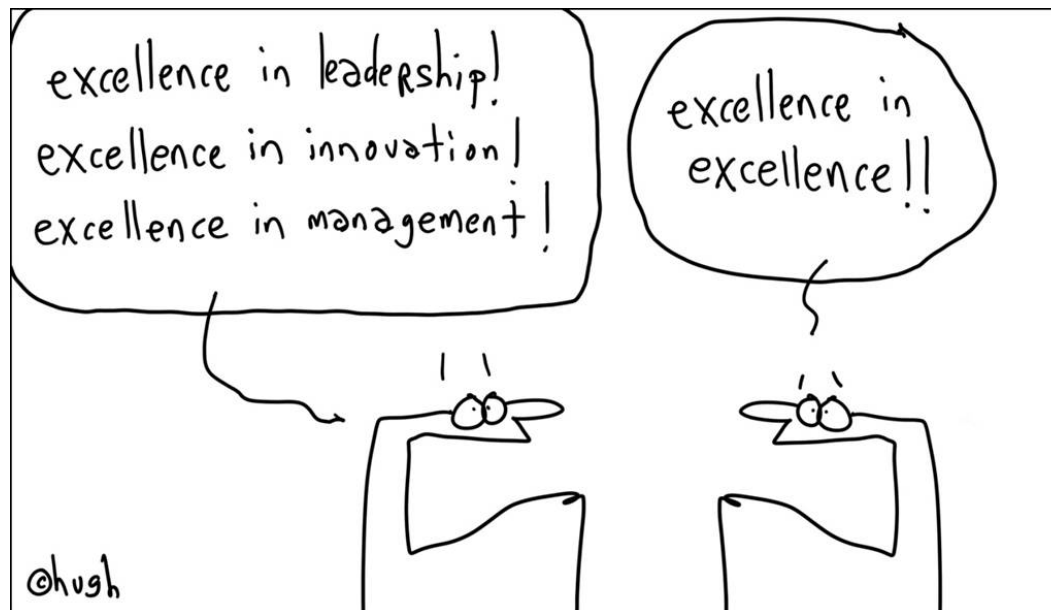
## Comments, questions?

9 July 2010

Science System Assessment

Verbree, M., van der Weijden, I., van den Besselaar, P.,  
Research management of high-performing academic  
research groups, forthcoming.

[m.verbree@rathenau.nl](mailto:m.verbree@rathenau.nl)



# Formula Performance-index

9 July 2010

## Science System Assessment

$$\text{performance index} = \frac{\left[ \frac{P}{P_{\max}} + \frac{C}{C_{\max}} + \frac{X}{X_{\max}} + \frac{Y}{Y_{\max}} \right]}{4}$$

- where  $P$  is the number of publications,
- $C$  is the number of citations,
- $X$  is  $C/P$ ,
- $Y$  is  $P/\text{group size}$ ,
- $P_{\max}$  is the maximum value of  $P$  within the sample, which varies by discipline,
- $C_{\max}$  is the maximum value of  $C$  within the sample, which varies by discipline,
- $X_{\max}$  is the maximum value of  $C/P$  within the sample, which varies by discipline,
- $Y_{\max}$  is the maximum value of  $P/\text{group size}$  within the sample, which varies by discipline