

# Innovation in nuclear power

Jan Blomgren

# INBEx in brief

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Institute for Nuclear Business Excellence

[www.INBEx.se](http://www.INBEx.se)

Roots in Sweden and Finland

Global operation

Services on nuclear business leadership:

- Independent advice
- Executive training
- Build-up of emerging nuclear countries

Jan Blomgren, CEO and founder

25 fellows in 8 countries in Northern Europe

A majority has experience as CEOs, Director General and similar



# Nuclear new-build then and now

## Then

Nuclear power did not exist  
 Large need for R&D  
 Construction of research reactors  
 for competence build-up  
 Cutting-edge research



## Different now

Buy "off-the-shelf"  
 Mature technology  
 Competence build-up  
 by joining in  
 Not the research frontier



# Plant construction and safety

## Similar

Plant construction:  
 Basically same thinking  
 Evolution, not revolution  
 More of the same

Safety requirements:  
 Basically same thinking

## Different now

Plants are larger  
 More complex  
 Increased redundancy

More defence in depth  
 Emphasis on core melt  
 Increased volume of  
 paperwork  
 Broader understanding  
 requested  
 Human+Organization  
 factors more highlighted



*Friday 11-13 at Nairobi university: All about present NPPs - the thinking behind*

# Market structure

## Then

Regulated market  
 Cost+reasonable profit  
 Governmental support

Domestic markets  
 Domestic suppliers

One supplier for all

Long series of projects  
 Time to build competence  
 Suppliers well trained

Other domestic industry  
 involved

## Different now

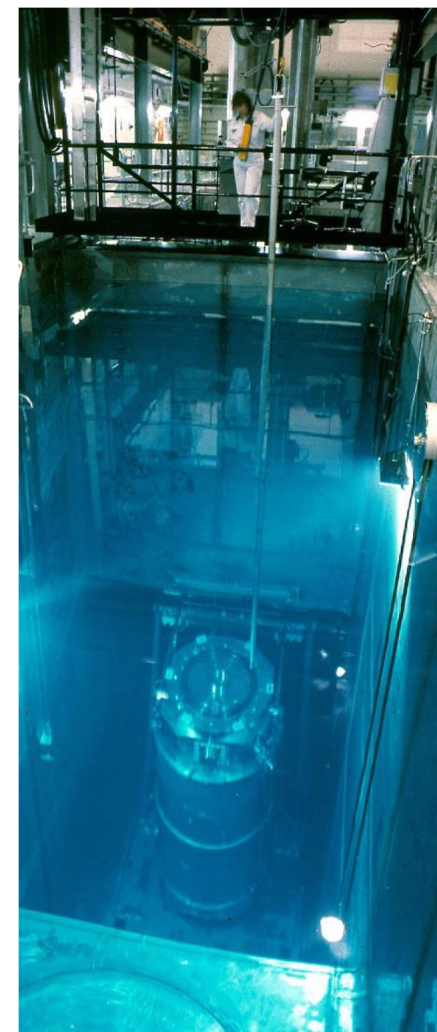
De-regulated markets  
 Uncertain revenue  
 Little or no support

International market  
 Global suppliers

Complex supply chains

Projects short and uncertain  
 USA and Europe:  
 Suppliers not well trained

USA and Europe:  
 de-industrialized  
 Few forgeries, etc.



# Failure in large technology projects

## Why do large technical projects fail?

- 15 % poor technology
- 15 % project management
- 20 % other reasons
- 50 % culture and communication



## My prediction of causes for failure:

- Corruption
- Licensing mis-communication
- Unclear roles and responsibilities

My "definition" of culture:

This is how we do things here

# Past mistakes – and how to avoid them

## Then

Design from scratch  
Problems discovered  
at construction site

Delays and cost increase

Licensing delay

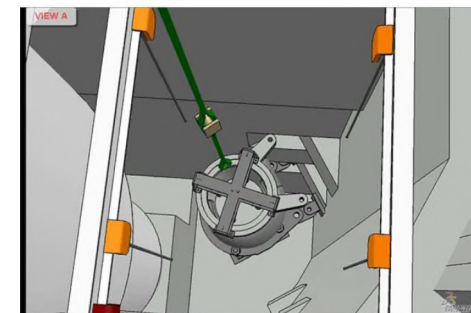
## How to avoid

4D-construction (innovation)  
Build the plant  
in the computer

“Buy a plant, not a reactor”  
Main contractor (nuclear island)  
Qualification: must supply large  
and critical parts  
Responsible for supply chain

Make sure all parties  
win together (or all lose...)

Develop own criteria stricter than the regulator’s  
Communicate with the regulator all along



# The chain of knowledge

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Design → construction → operation →  
lifetime management → waste handling →  
decommissioning

Traditional: poor communication in each  
step

New-comers have a potential:  
Use the same the 4D model all the way!

Maintenance and ageing management starts  
at the drawing table





# Plant health monitoring

## Back in time:

Monitors were expensive

Limited I&C capacity

Analog readout

## Today:

Sensors are cheap

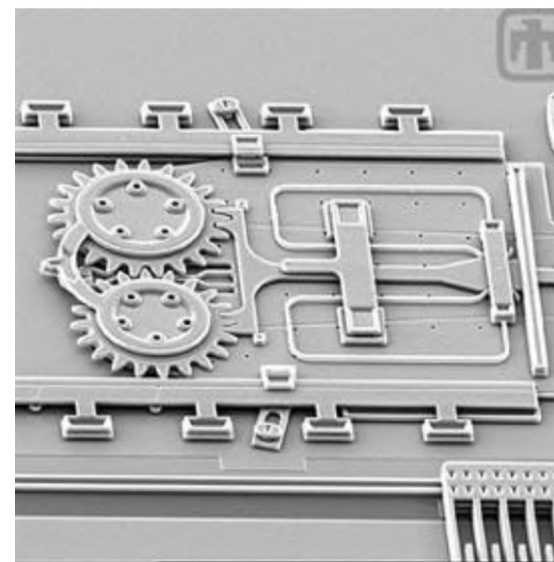
Digital readout

Enormous readout capacity

"Internet of things"

Put sensors "everywhere" and accept that some fail (redundancy)

Increase the use of traditional sacrificial specimen



# Innovation for newbuild

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## Information handling

Demand you get all design with documentation

Use modern software tools

Build a unbroken chain of information

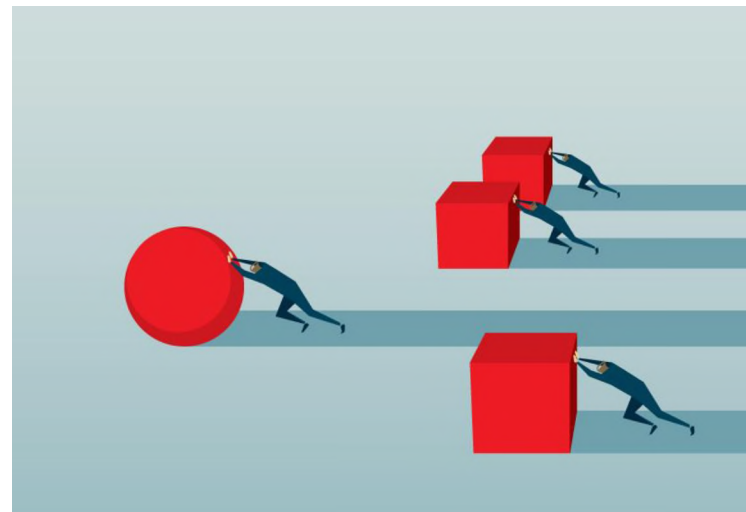
## Plant health monitoring

Apply sensors close to everywhere

## Handle non-technical aspects better

Sorry, no simple solution...

However, embrace diversity



# General advice for newbuild

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- Understand it is >100 years commitment
- Do not buy a reactor – buy a nuclear power plant
- Guarantee funding at low cost
- Secure 40 years of electricity sales
- Realize single units hard to make profitable
- Ensure legal framework is in place
- Put emphasis on public acceptance
- Understand infrastructure limitations
- Define useful selection criteria



# Contact

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