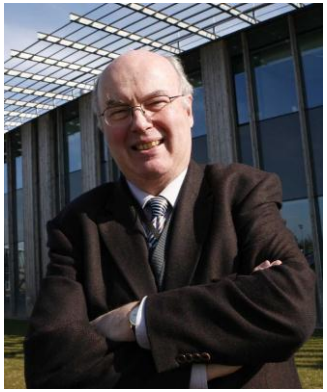
Networking of European research facilities
Past experiences and future prospects

Michel van der Rest
Former CEO of synchrotron SOLEIL

Professor Michel van der Rest



Job title: Former Director General of SOLEIL Synchrotron

Education: Biochemist trained initially in Belgium
PhD in Canada (Montreal)

Work experience and skills:

- 20 years of experience in Canada (U. of Montreal and McGill U.) and 23 years of experience in France (Professor at ENS of Lyon, now emeritus)
- Director of the Institute for Structural Biology in Grenoble (1994-2001)
- Director of Research of ENS of Lyon (2000-2005)
- Director of CNRS Life Science Department at national level(2005-2007)
- CEO of national French synchrotron SOLEIL (2007-2011)
- Chair of ERF (2009-2011)
- Member of the board of RAMIRI2 (2011-2012)
- Vice-chair of the Council of ESRF in Grenoble (2011-)

Research Infrastructures : a very diverse breed of animals

- Local vs national vs international
- Single-site facility (eg. synchrotrons)
- Multiple-site facility in one or several countries (eg. EMBL, ESO)
- 'Virtual', distributed facilities (eg. database management projects)

With various legal statutes:

- International organisation (eg. CERN, EMBL)
- Not-for-profit private company subject to national laws (eg. ESRF, SOLEIL)
- RI managed by a research institute or university with or without external collaborative teams
- ERIC (or other legal entity) with or without subsidiaries in other countries
- ERIC (or other legal entity) with a core institute and teams employed by national labs or universities
- …

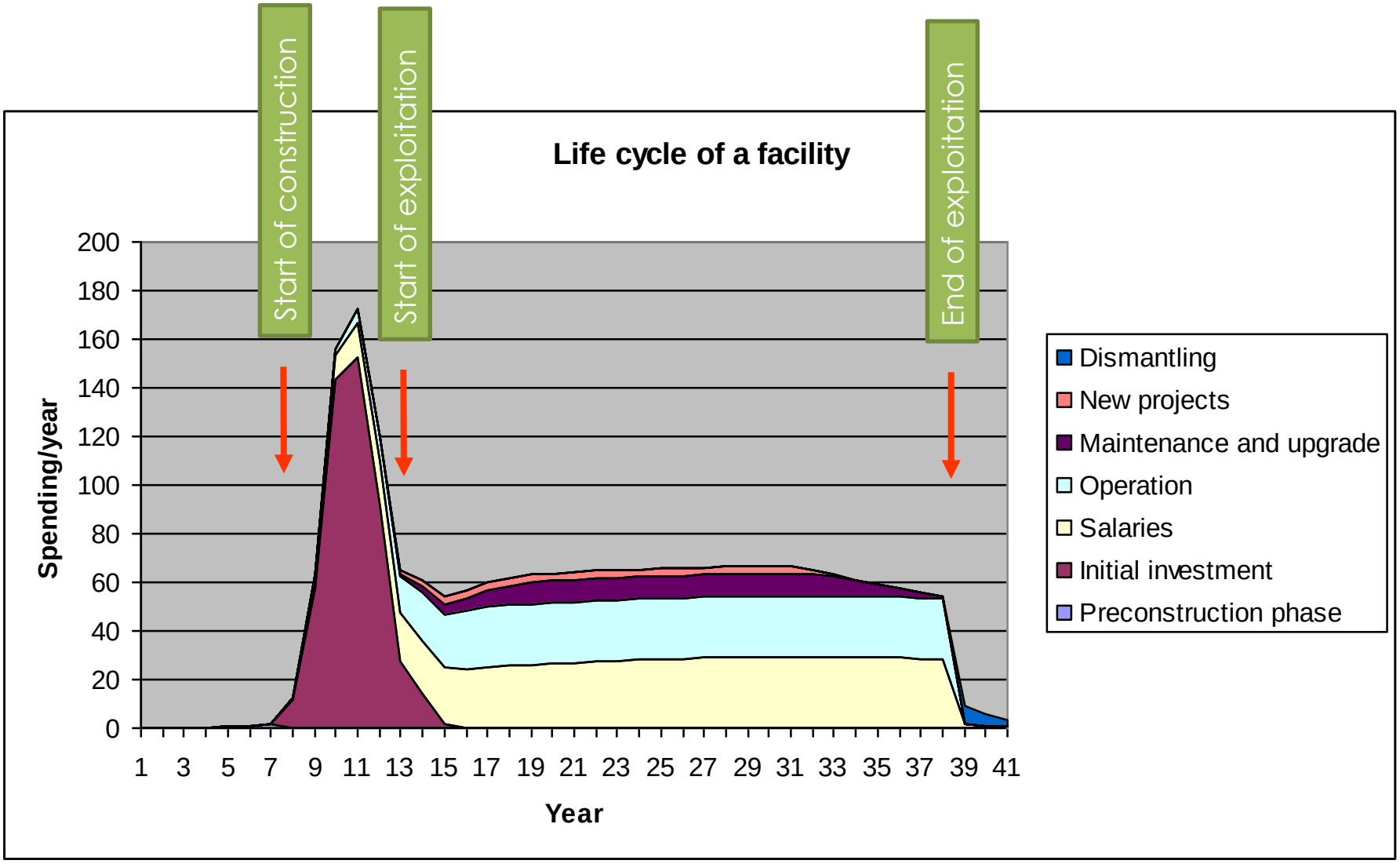
Like all living organisms, research infrastructures have a life cycle

- Any facility has a life cycle that can vary from a few years (e.g. computing platforms) to centuries (e.g. libraries)

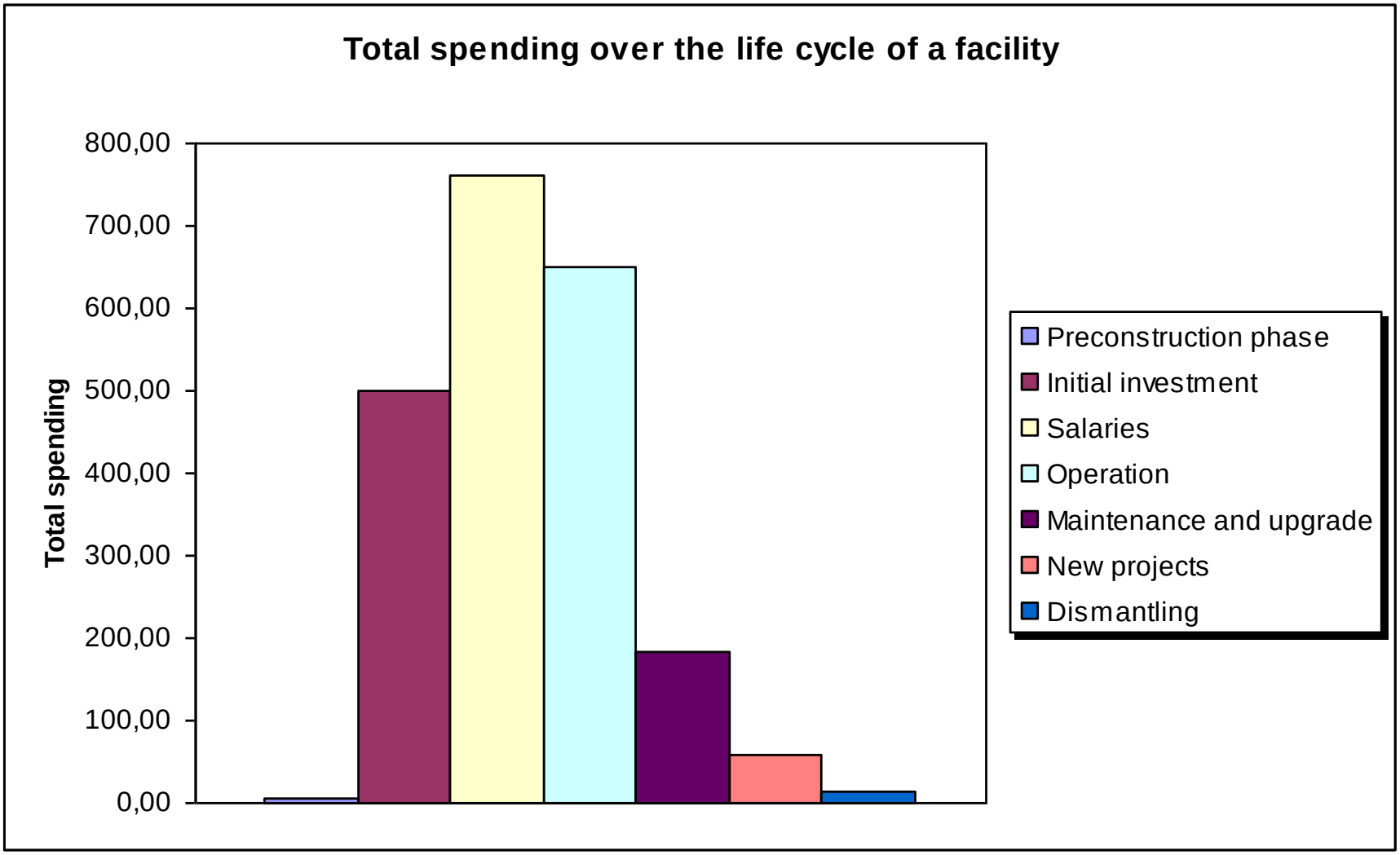
- Four major phases in the life cycle of a facility:

  - Pre-construction phase
    (scientific, technical and financial cases, design and planning of the facility)
  - Construction phase and commissioning
  - Operation phase, with possible upgrades
  - Shut down and dismantlement phase.

Spending pattern for a 500 M€ facility



The initial investment represents
24% of the total spending!



Research infrastructures should develop a social life between themselves

- To exchange on best practices for the construction and operation of the facility at the scientific, administrative and financial levels.
- To better respond to the needs of the research communities in terms of platforms (avoid unnecessary duplication, ensure that the required state of the art tools are available, etc.)
- To develop or maintain a cooperation-competition spirit with similar facilities, as this will drive a continuous improvement of all the facilities.
- To get more visibility at the scientific, societal and political levels.
- To interact more efficiently with national and European authorities

Examples of structuration and networking at the European level between RIs

- EIROFORUM, the association of European international facilities.
- ERF, the association of European national research facilities open to international access.
- The detector consortium between all European synchrotrons.
- RAMIRI (Realizing And Managing International Research Infrastructures), a EU supported program of formation to the management of research infrastructures.

These structures and projects are not fund raising oriented (unlike the I3 consortia for example)

EIROforum

http://www.eiroforum.org/

EIROforum : a light coordination structure between major European international RIs

- Created in 2002.
- EIROforum is a partnership between eight of Europe's largest inter-governmental scientific research organisations that are responsible for infrastructures and laboratories: CERN, EFDA-JET, EMBL, ESA, ESO, ESRF, European XFEL and ILL.
- It is the mission of EIROforum to combine the resources, facilities and expertise of its member organisations to support European science in reaching its full potential.
- All these facilities are funded through some form of multinational agreements and are all completely independent of the EU.

The EUROforum charter

A number of powerful research infrastructures and laboratories which are used by an extensive network of scientists have been developed and deployed within Europe by European Intergovernmental Research Organisations since the early 1950s. These organisations have set up a co-ordination and collaboration Council (EIROforum) with their Directors General or equivalent as its members.

A primary goal of EIROforum is to play an active and constructive role in promoting the quality and impact of European Research. In particular the EIROforum Council will be a basis for effective, high-level interaction and co-ordination between the member organisations. It will mobilise its substantial combined expertise in basic research and in the management of large international infrastructures, facilities and programmes, for the benefit of European research and development. This will be pursued by exploiting the existing intimate links between the member organisations and their respective European research communities.

EIROforum

The aims of EIROforum are, in particular, to:

1. Encourage and facilitate discussions among its members on issues of common interest, which are relevant to research and development.
2. Maximise the scientific return and optimise the use of resources and facilities by sharing relevant developments and results, whenever feasible.
3. Co-ordinate the outreach activities of the organisations, including technology transfer and public education.
4. Take an active part, in collaboration with other European scientific organisations, in a forward-look at promising and/or developing research directions and priorities, in particular in relation to new large-scale research infrastructures.
5. Simplify high-level interactions with the European Commission (EC) and other organs of the European Union, and enable an effective response to specific requests for expert advice in the areas covered by the member organisations.
6. Provide co-ordinated representation to the outside world including the general public, national governments, non-European countries etc.

ERF : European association of national Research Facilities

Main features of ERF

- Free association based on mutual agreement
- Members are European national large scale facilities
  - Centered on providing analytical tools for characterization of matter in all its forms, based on the exploitation of large equipments derived from Physics (synchrotrons, neutron or ion sources, lasers, high magnetic fields, etc…) ;
  - Most are single sited ;
  - Providing free access after peer reviewing of proposals to national and international users.
- The mission of ERF
  - To promote dialogue and concerted actions between national large scale facilities on key common issues, such as access modalities and financing, staff mobility, energy cost, EU framework programs, etc.
- Members
  - BNC Budapest (H), DESY Hamburg (D), Elettra Trieste (I), FOM Rijnhuizen (NL), FRM-II Munich (D), GANIL Caen (F), GSI Darmstadt (D), HZB Berlin (D), LLB Saclay (F), LNCMI Toulouse (F), MAX-lab Lund (S), MBI Berlin (D), PSI Villigen (CH), SOLEIL Saclay (F), STFC Harwell (UK)

ERF challenges

- Access to the facilities. Who pays for the services?
- Career development, optimization of human resources and mobility
- Operation costs vs limited budgets (e.g. energy)
- Scientific evaluation and impact assessment
- Instrumentation developments and technology transfers

ERF seminars

- Original events gathering about hundred participants
- Overview of the current best practices
  - real time benchmarking ?
- Conclusions are translated into position papers
  - In line with other pan-European initiatives (survey, middle-range RIs, new FP instruments for FP8, etc)
- Regularly re-examined by the ERF Board
- Fall 2009 in Lund : Future Access to European Research Infrastructures: benefits to Academia, Industry and Society
- Fall 2010 in Villingen : Human capital in modern European Research Infrastructures
- Fall 2011 in Lund : Energy for Large Research Infrastructure
- Spring 2012 in Hamburg : Socio-economic relevance of research infrastructures

ERF RECOMMANDATION PAPERS

- Horizon 2020: the ERF is calling for an increase of the EU budget for R&D November 2012
- Science Europe ERA Contribution December 2011
- ERF position paper on Horizon 2020 December 2011
- Main Findings of the workshop on Energy Management October 2011
- Research Infrastructures Staff Exchange (RISE) November 2011
- About the situation of ITER Financing December 2010

European synchrotrons detector initiative

- First example of a common program involving **all** European synchrotrons.
- Essential for the long term competitiveness of European facilities.
- All facilities have a detector group but no facility has the critical mass to make all needed developments.
- The initiative is based of shared decisions on the needed common developments and on the strategy to implement them.

An agreement based on « strong » principles

- Mode of collaboration : be flexible
  - variable geometry collaborations (case by case depending on each project)
- Finance: very few in-kind contribution
  - a « common-pot » contribution (painful but safe)
  - ban strict (or arranged) mathematical « juste retour »
- Global architecture
  - multi-sites organisation with mixed teams seconded in host facilities (50% of staff); encourage mobility and exchanges of expertise
  - a unique project manager (PM) for each project
- Project management
  - large delegation to the PM but exhaustive reporting to the high-level structure
  - workpackages organisation: facilitate the sub-contracting of part developments (European-wide calls for technology transfer ?)
- Legal structure : be progressive
  - a « light » high-level structure (dialogue on strategic R&D agenda)
  - a more « solid » one as long as the projects are going elaborated (stronger commitments): a « shareholding configuration » (separate consortia)?
- IPR management
  - background (in-kind), sideground (separate), foreground (shared)

The RAMIRI project

- RAMIRI stands for Realising and Managing International Research Infrastructures and is a project funded by the European Commission under FP7.
- The RAMIRI project aims to deliver a training **and networking** programme for people involved in planning and managing international research infrastructures within the European Union (and Associated States).

The topics addressed by RAMIRI

- Making the Case and Setting the Scene
- Life Cycle of a Research Infrastructure
- Legal and Governance Issues
- Finance
- Human Resources
- Research Infrastructure Management

The main achievements of RAMIRI 2

- Training to two groups of attendees (about 40 people each)
- Two sessions of two full days in a one year period (2011 and 2012) for each group
- Intermediate debriefing meeting of the organizers between the sessions
- Networking of RAMIRI alumni (e.g. implication of former alumni in the continuation of the program)
- Production of a handbook

Outline of the RAMIRI handbook

Chapter 1: Making the Case and Setting the Scene

1.1. Introduction
1.2. Definition of a Research Infrastructure and its pan-European interest
1.3. Why is good governance of RIs so important, and why in particular for Europe?
1.4. Research, Development and Innovation: meaning and how RIs can contribute
1.5. Shareholders and Stakeholders: expectations and communication
1.6. RAMIRI Training Slides

Chapter 2: Life Cycle of a Research Infrastructure

2.1. Introduction and definition of the life-cycle phases
2.1.1 Initial conception and preparation: the incubation phase
2.1.2 Conceptual design phase
2.1.3 Executive and technical design phase
2.1.4 Construction phase
2.1.5 Commissioning and operation
2.1.6 Decommissioning and/or major upgrade and new life-cycle
2.1.7 The FP7/ESFRI "Preparatory Phase"
2.2. Project Cycles and Project Management
2.3. RAMIRI Training Slides

Chapter 3: Legal and Governance Issues

3.1. Introduction
3.2. Governance - Management interplay
3.3. Negotiating and developing the governance and scope
3.4. The basic elements of a legal structure
3.5. The choice between alternative legal structures
3.6. The European Research Infrastructure Consortium-ERIC
3.7. Commonalities and differences between single-site and distributed RIs
3.8. Definition and role of partners, regional partners, and regional RIs
3.9. RAMIRI Training Slides

Chapter 4: Finance

4.1. Introduction
4.1.1 Characteristics of RIs with respect to financial issues
4.1.2 Content of the chapter
4.2. Estimating, costing and budgeting the needs of a RI
4.2.1 Main principles and steps of budgeting in the context of a RI
4.2.2 Main cost categories and their characteristics
4.2.3 Overview of the spending profile and evolution of the cost distribution of various types of RIs
4.2.3.1 Single site hardware based RIs
4.2.3.2 Virtual RIs
4.3. Funding sources
4.3.1 Overview of the various types of funding 4.3.1.1 National funding
4.3.1.2 European funding
4.3.1.3 International funding
4.3.1.4 Philanthropic organisations / donations
4.3.2 Funding and Governance
4.4. Financial instruments
4.4.1 Loans (EIB/RSFF, banks/commercial)
4.4.2 Public Private Partnerships
4.5. RAMIRI Training Slides

Chapter 5: Human Resources

5.1. Introduction
5.2. General framework
5.3. Staffing and its evolution during the facility life time
5.4. Commonalities and differences in single site and distributed RIs, and in different countries - conditions of employment
5.5. Recruiting, staff evolution / career development / mobility, integration and support /attractiveness, equal opportunities, work/life balance
5.5.1 Recruitment
5.5.2 Staff evolution / career development / mobility
5.5.3 Integration and support - attractiveness
5.5.4 Equal opportunities
5.5.5 Work / life balance
5.6. Case studies on Human Resources for Distributed Infrastructures
5.6.1 Case Studies
5.6.2 Human Resource Planning
5.6.3 Recruiting and Attractiveness
5.7. RAMIRI Training Slides

Chapter 6: Research Infrastructure Management

6.1. Introduction
6.2. Managing an established facility (general outline)
6.3. How to set the course: mission, vision and strategic planning
6.4. How to ensure quality and users satisfaction
6.5. How to communicate
6.6. How to liaise with Industry
6.7. How to develop sustainability and fund raising
6.8. RAMIRI Training Slides

Outline of the RAMIRI handbook : The chapter on human resources

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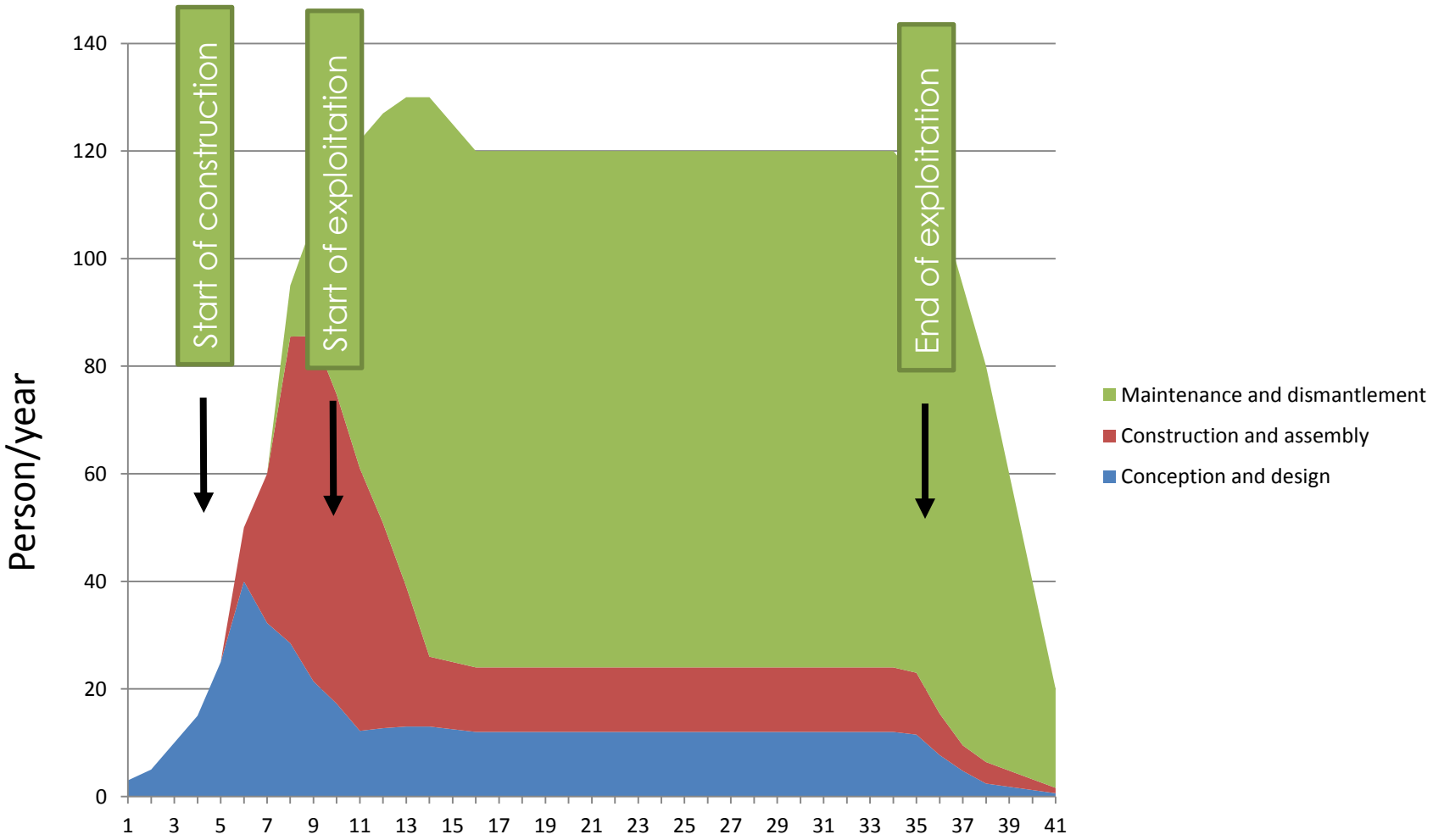
Example of experience based analysis

Evolution of tasks for engineers and technicians



Questions for the future

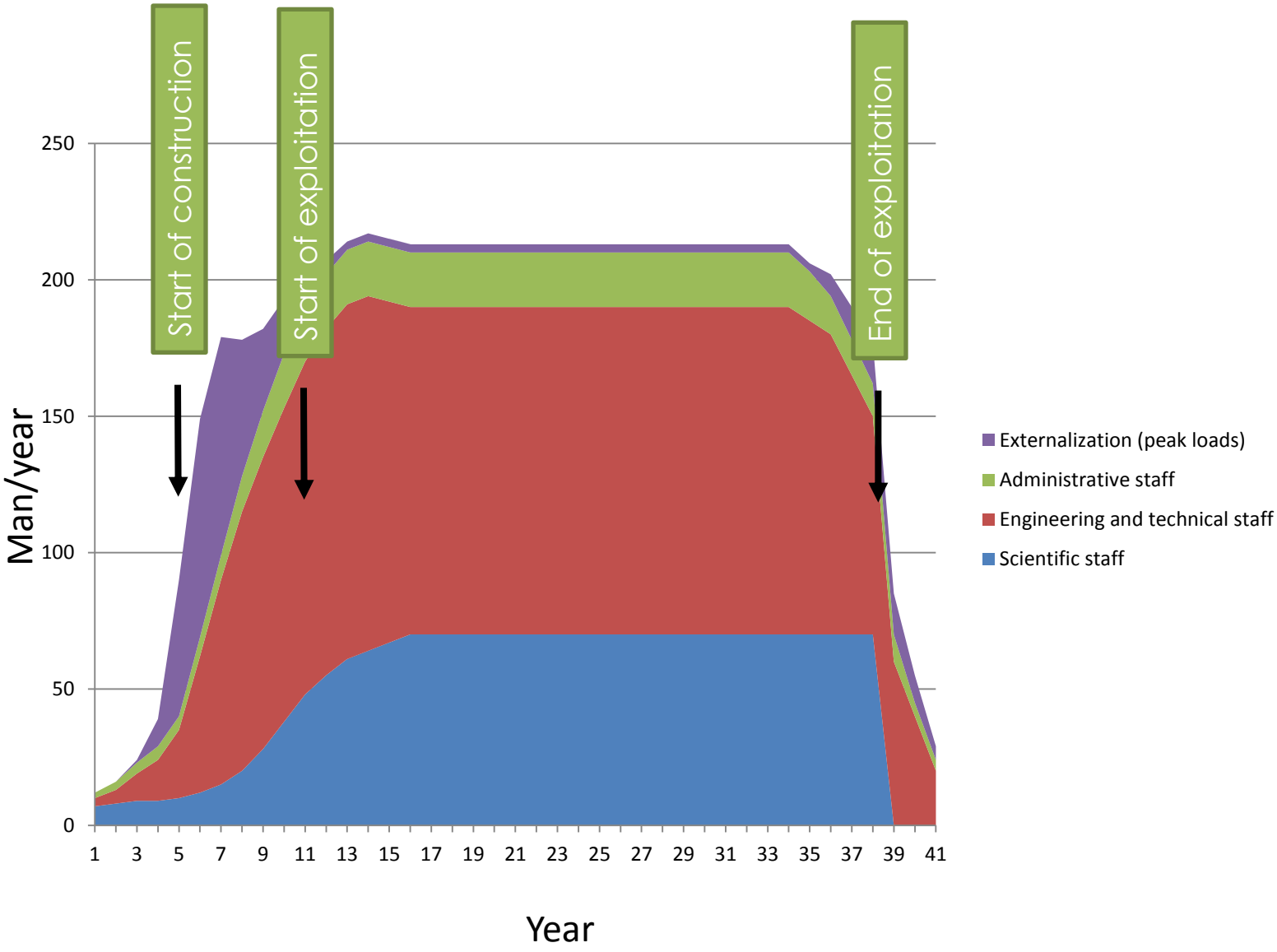
- Europe is competing with large “federally” structured nations : USA, China, Japan, India, Russia. Is the “networking” model of integration of RIs sufficient to remain competitive in front of more structured decision making entities?
- Should EU become a federal authority as far as very large RIs are concerned?
- Does EU have the long term financial visibility and reactivity to make the long term commitments that are needed to build and operate very large RIs?

General Comments on the “Human Factor"

- Staff competence and motivation are the major assets for the success of a research infrastructure
- General rules for proper management of human resources also apply to RI
- However, some specificities linked to the type of funding and the nature of operation must be underlined

You must make a forecast of the evolution of staff during the life cycle of the facility!

Staff evolution during the life cycle of a facility



Staff career development

- A RI can be compared to a SME, but there are differences:
  - The life time is limited and more or less determined at the start
  - Success does not result in increased productivity or income to the enterprise but in top scientific results
  - Hence, the staff number remains relatively constant throughout the operation phase; staff promotion within the structure is therefore more difficult

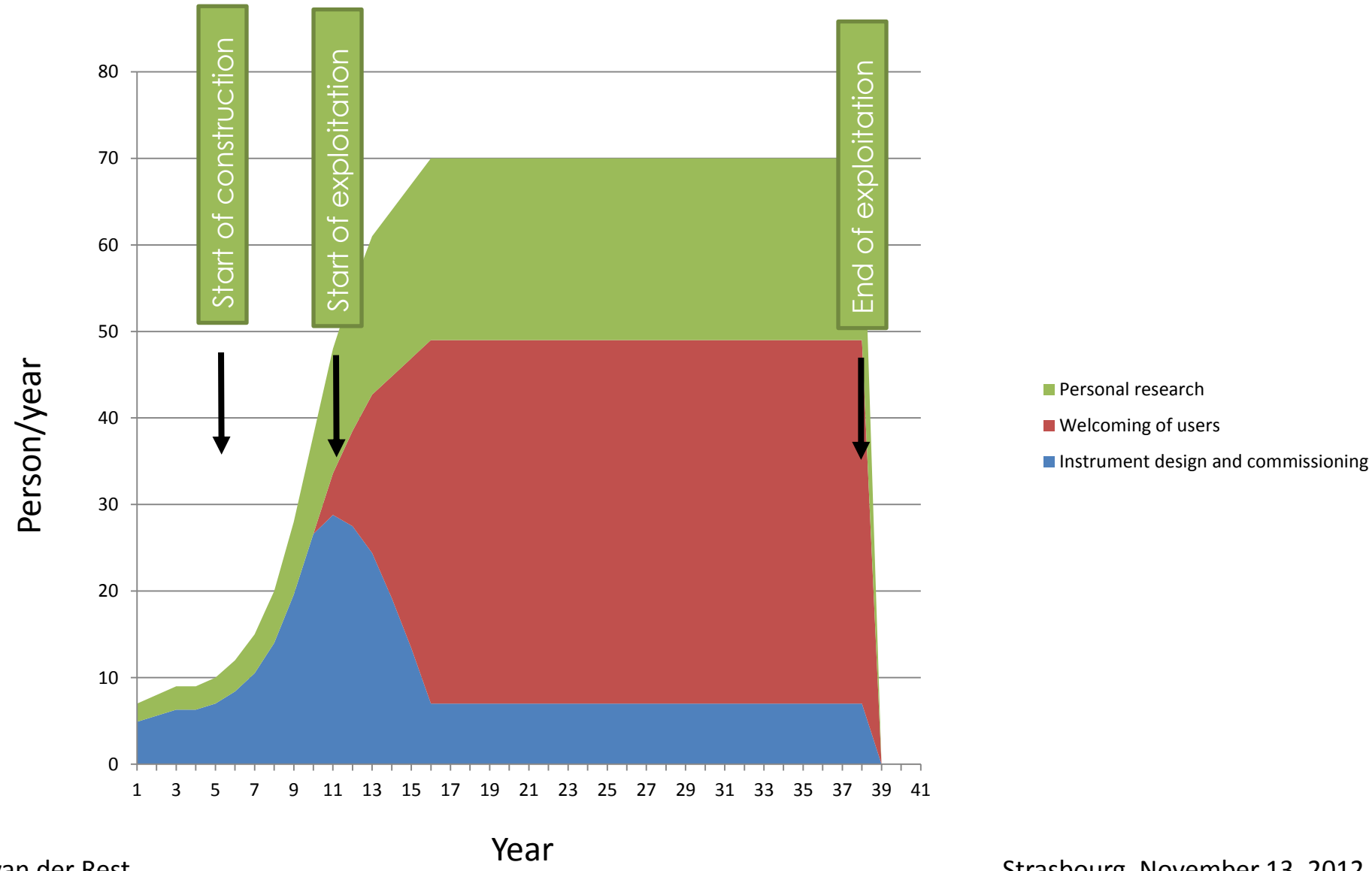
- Staff hiring is made in a relatively short period of time.
  - The age pyramid is usually very young at the beginning
  - Strong wage drift effect (through yearly increments to staff) on the overall salary burden
  - Promotions are expected at the same time by many staff members. Cannot make an 'army of colonels'!

- Staff usually comprises many small groups of highly specialized individuals.
  - Mobility between groups is very limited

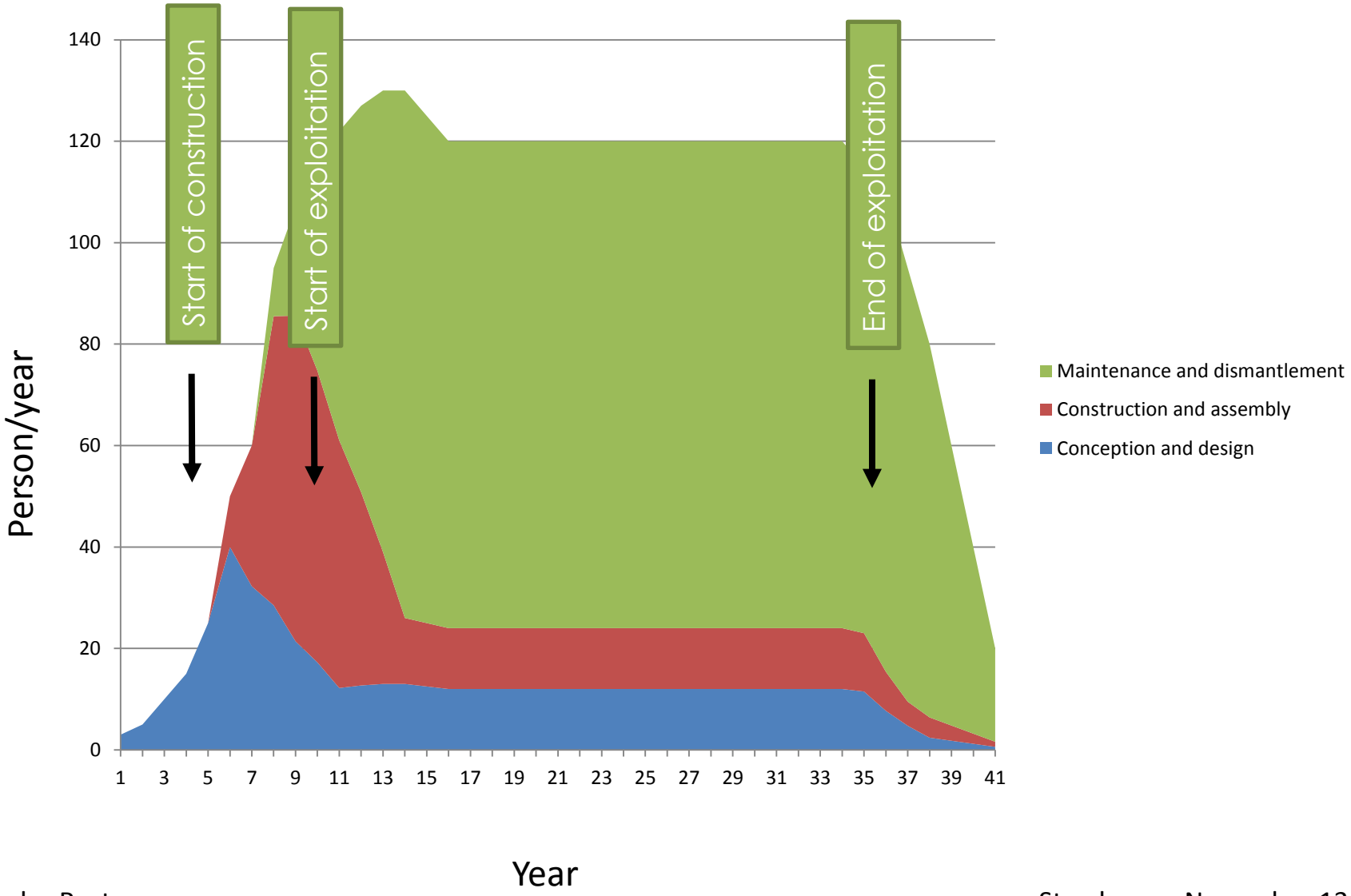
Staff job evolutions

- The career of an individual spans about 40 years, greater than the life expectancy of many RIs!
  - Provision (and previsions) for decommissioning and wind-up is not only for buildings and equipment, but crucially, also for staff
- The nature of the job changes with the transition from construction to operation of the facility
  - Scientists switch from equipment design and commissioning to support of users
  - Engineers and technicians switch from conception and construction of equipment to maintenance and ‘after sale’ service
  - Purchasing staff switches from a few high-value orders to a high number of small-value orders

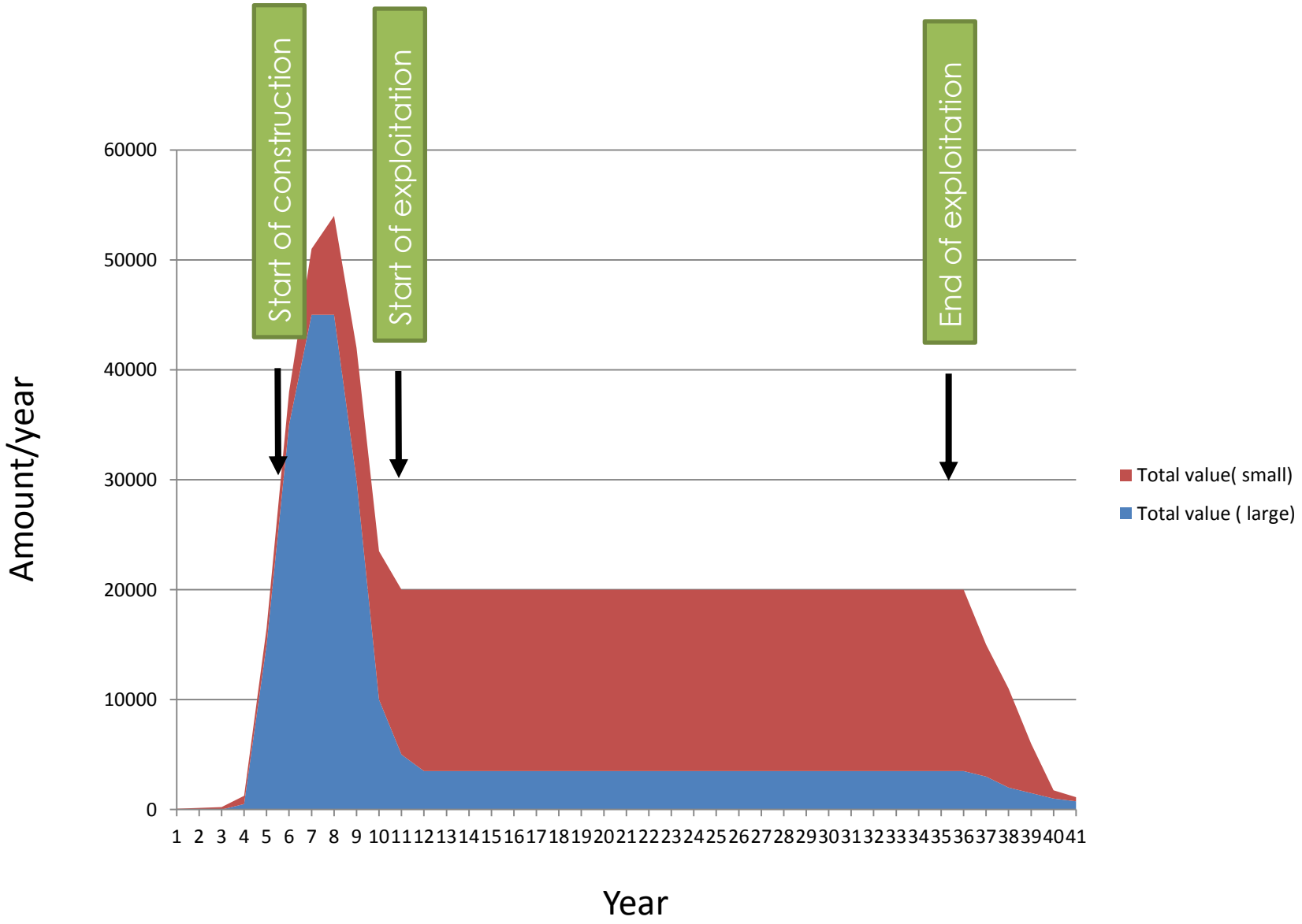
Evolution of tasks for scientific staff



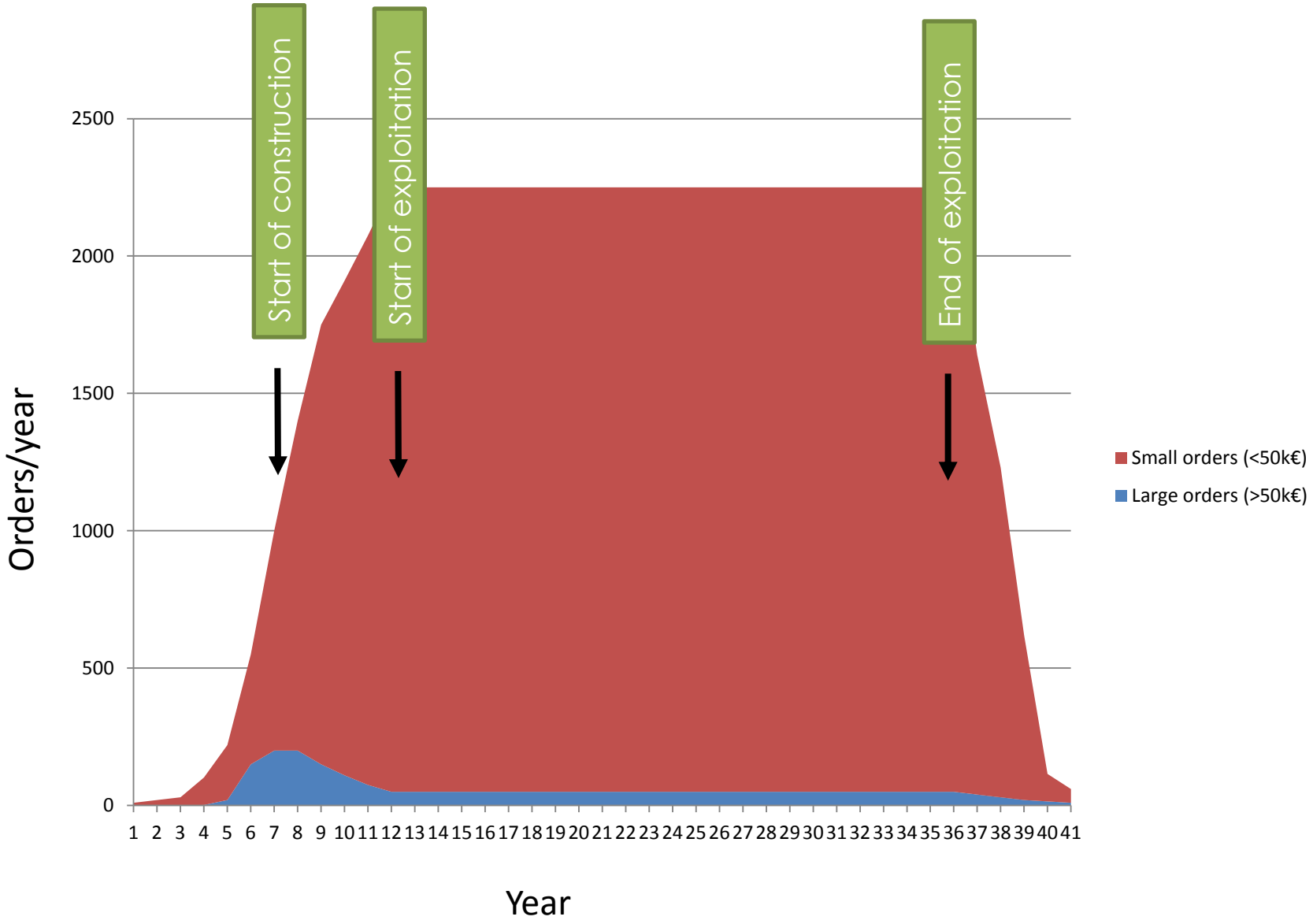
Evolution of tasks for engineers and technicians



Evolution of the total value of orders



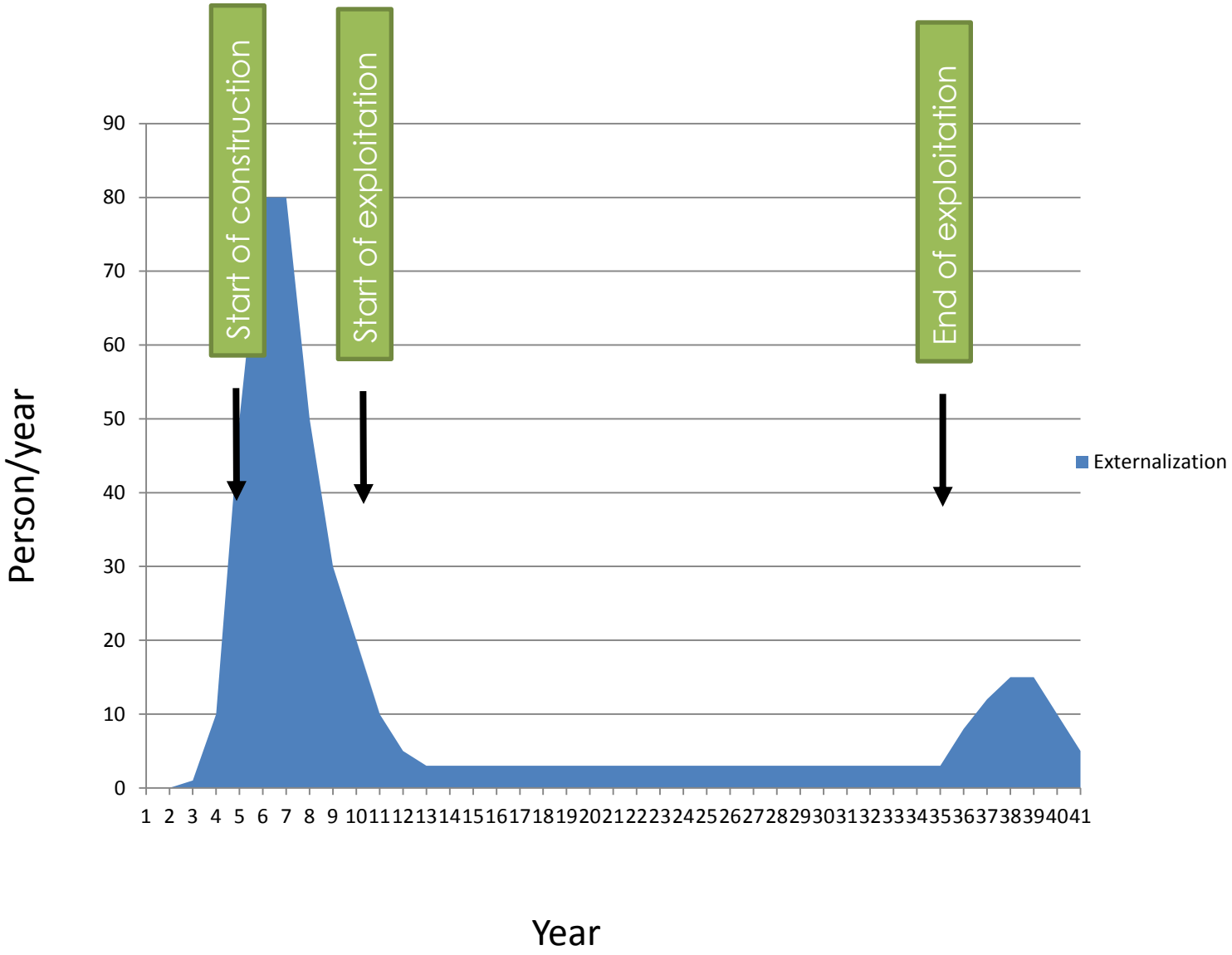
Evolution of the number of orders



Coping with these constraints

- Articulate a clear vision of the long-term evolution of your staff (advancement, nature of the jobs, etc.) from the beginning
- Share your vision with the staff as soon as you hire and throughout the life of the facility
- Encourage external mobility (in particular with other similar facilities that may be at another stage of development) even if it means immediate loss of know-how for your facility
- Favor outsourcing for those jobs and projects that have a short lifespan and do not result in usable know-how acquisition

Externalization/outsourcing (peak loads)



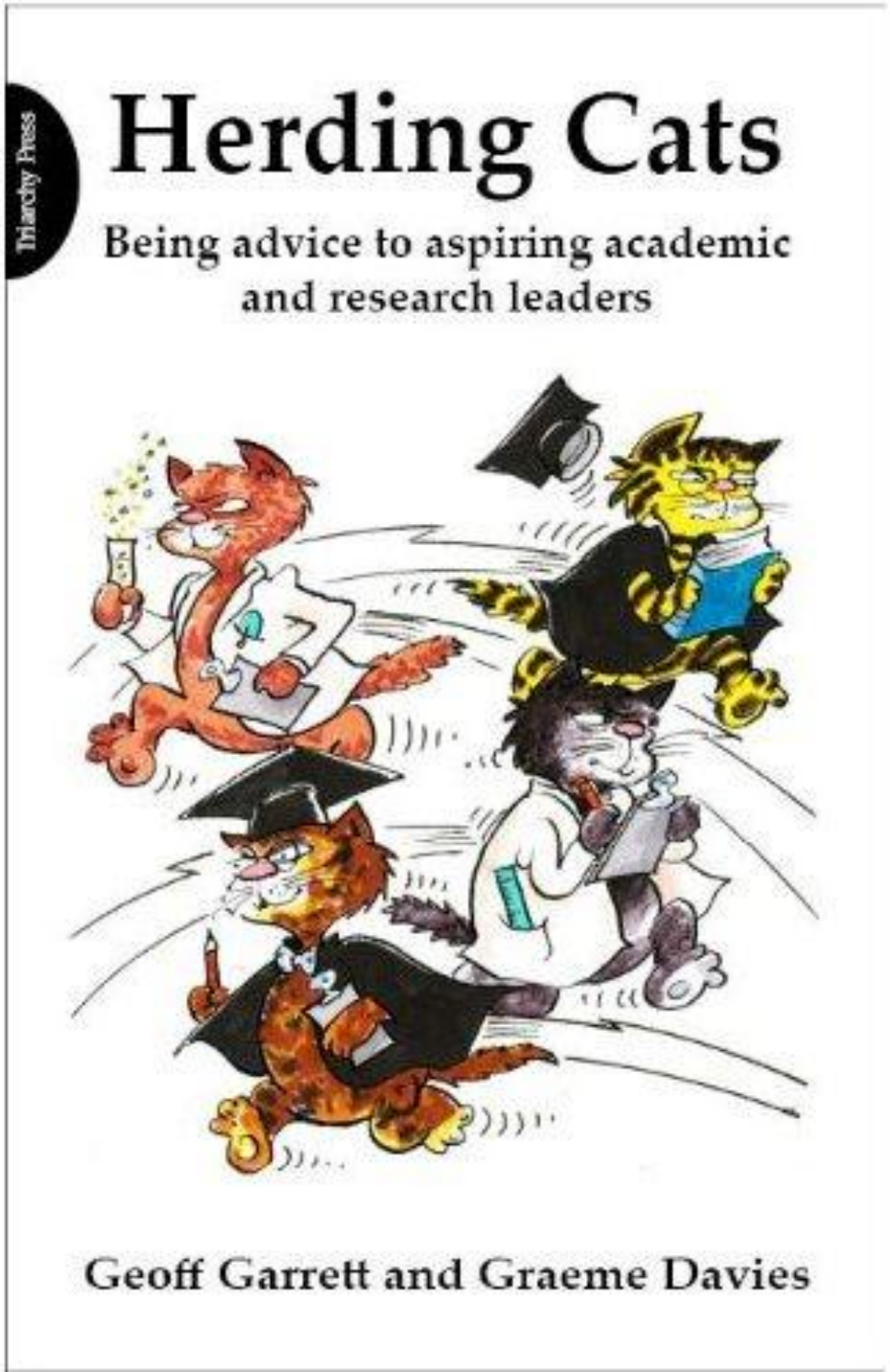
An important point to remember

- Many members of your staff have developed unique scientific or technical competences
- To achieve that they must have strong and inventive personalities and would qualify for, if they are not already in, academic positions within universities and national laboratories

→ Take advantage of the experience of academic colleagues who have engaged with the management of universities and faculties!

Cats will not be commanded and can choose their owner

Valeria Manferto De Fabianis (ed.)
Cats
(White Star Publishers, 2007)



Suggestions for managing a RI (1)

- Develop a strong project culture at your facility (project ≠ programme)

  Projects have a start, an end, a clearly established objective, a budget, identified participants for specified times, and a head.

- Evaluate your needs for staff for the operation phase of the facility; these must be your priority for permanent jobs.

- Build an organization chart that is known, understood and accepted by all

- Outsourcing and limited-term contracts are unavoidable, especially during the construction phase. Be sure that the transfer of know-how is guaranteed. These types of positions must always pertain to well identified projects

Suggestions for managing a RI (2)

- Do not expect that an outstanding ‘builder’ will turn into an enthusiastic maintenance specialist. Discuss this point with every person whose job is expected to switch from construction to maintenance
- Maintain a reasonable equilibrium for your scientists between user support and personal research
- Ensure that supervisors and project coordinators are well trained on work organisation, leadership and communication issues and that they avoid unnecessary stress in their teams
- Ensure that your RI is free from any discrimination, burnout and entrenched negative attitudes
- Encourage a good balance between family and professional life