Key resources for the coming years

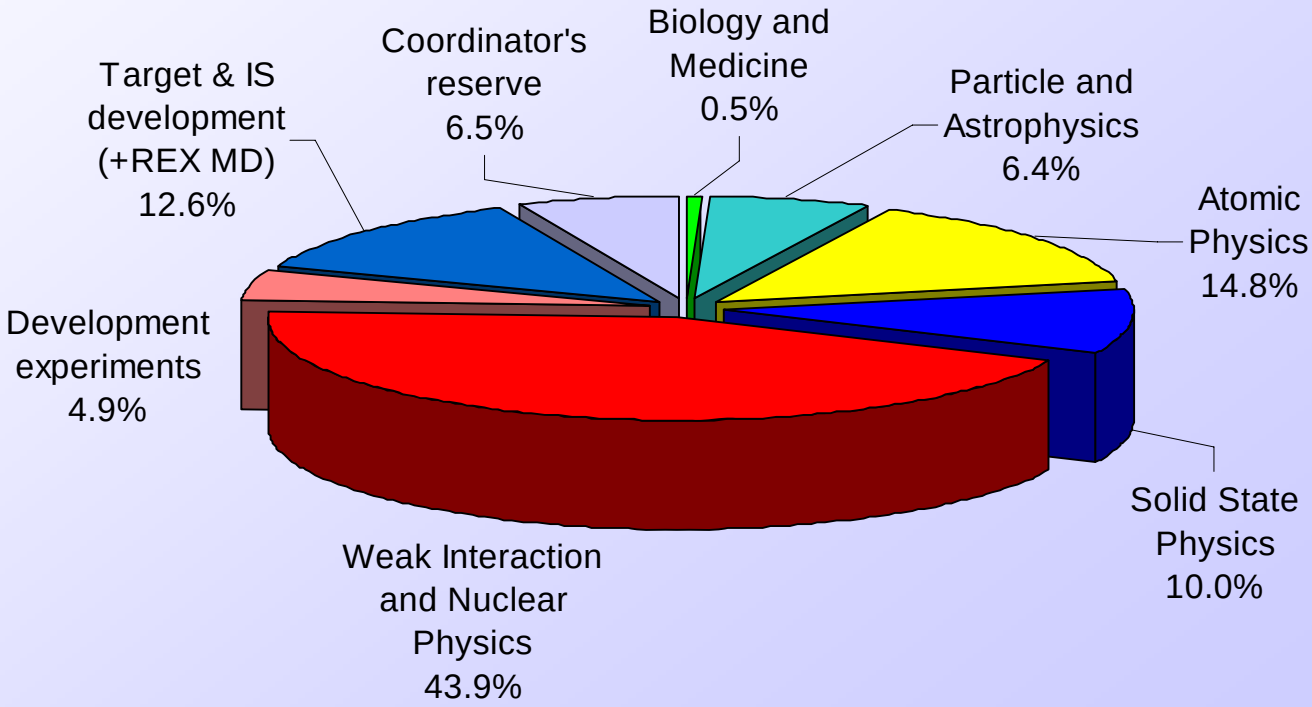
New physics priorities for target R&D

SGUI meeting, 22 May 2007

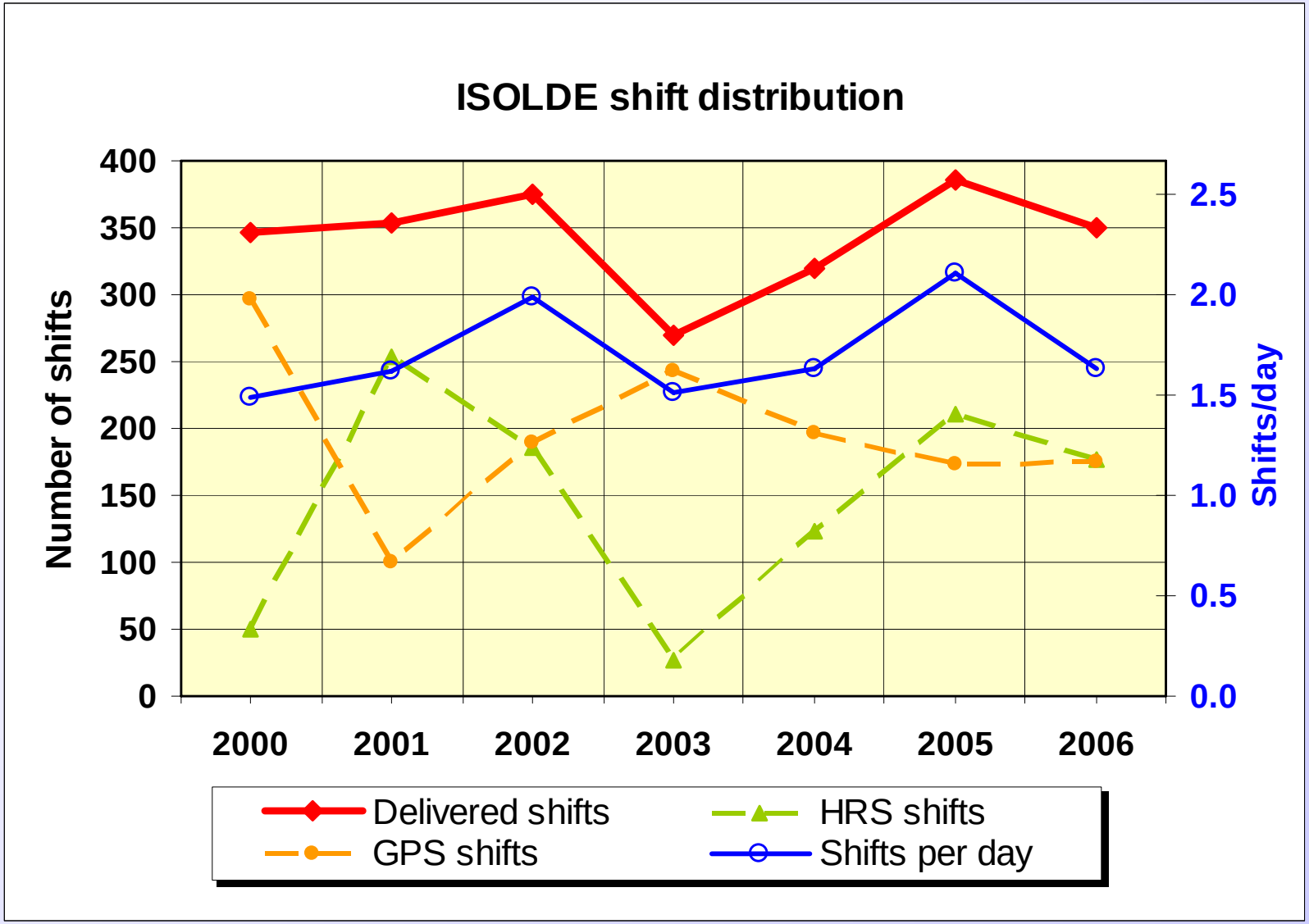
L.M. Fraile, CERN PH/IS

General statistics 2004-2006

- ✓ 1056 shifts delivered 2004-2006
  - → 101 experiments in 593 running days
  - → 1.78 shifts/day
- ✓ 854 (81%) shifts on INTC categories
  - → 19% TISD (including REX-MD) and coordinator's reserve



ISOLDE statistics 2004-2006



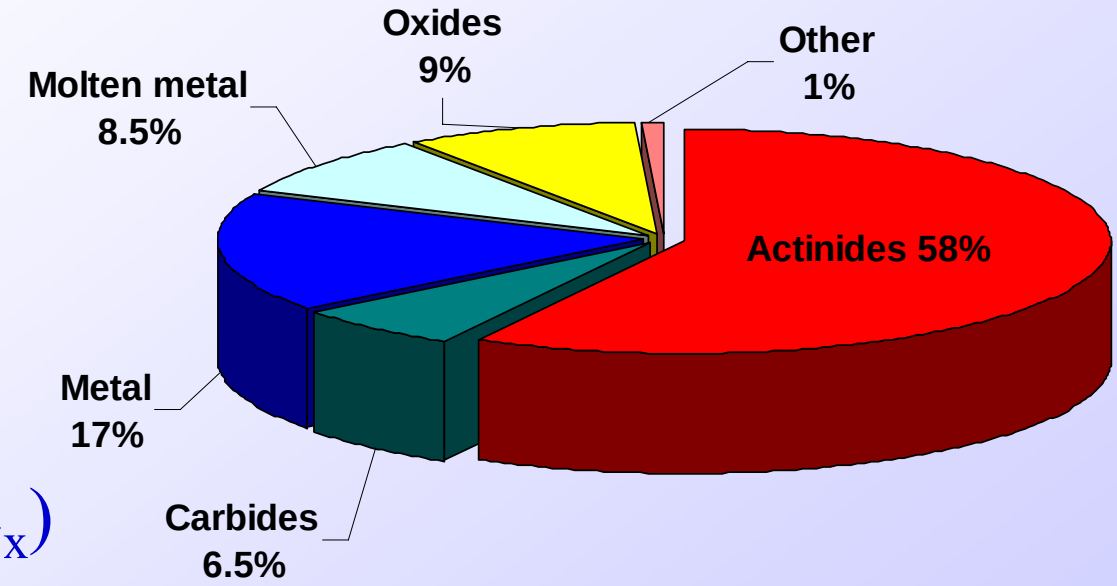
Resource planning

- ✓ Main resources
  - → Actinide targets
  - → RILIS
  - → REX-ISOLDE
  - → R&D activities
- ✓ All of the resources are pillars of ISOLDE research activities
- ✓ Estimates based on the trend over 2004-2006
- ✓ Consider 30 weeks beam time
  - → 375 RIB shifts
  - → 80% INTC shifts = 300 RIB shifts

I. Actinide targets 2004-2006

✓ **76** target units (all) used 2004 – 2006

Shift distribution ⇒



✓ Actinides (mostly UC_x)

→ 38 units (50%), **36** of then new

- 2 old units + a few re-used
- Not easy to reuse (ion source / mass markers / too irradiated)

→ **58% of radioactive beam time**

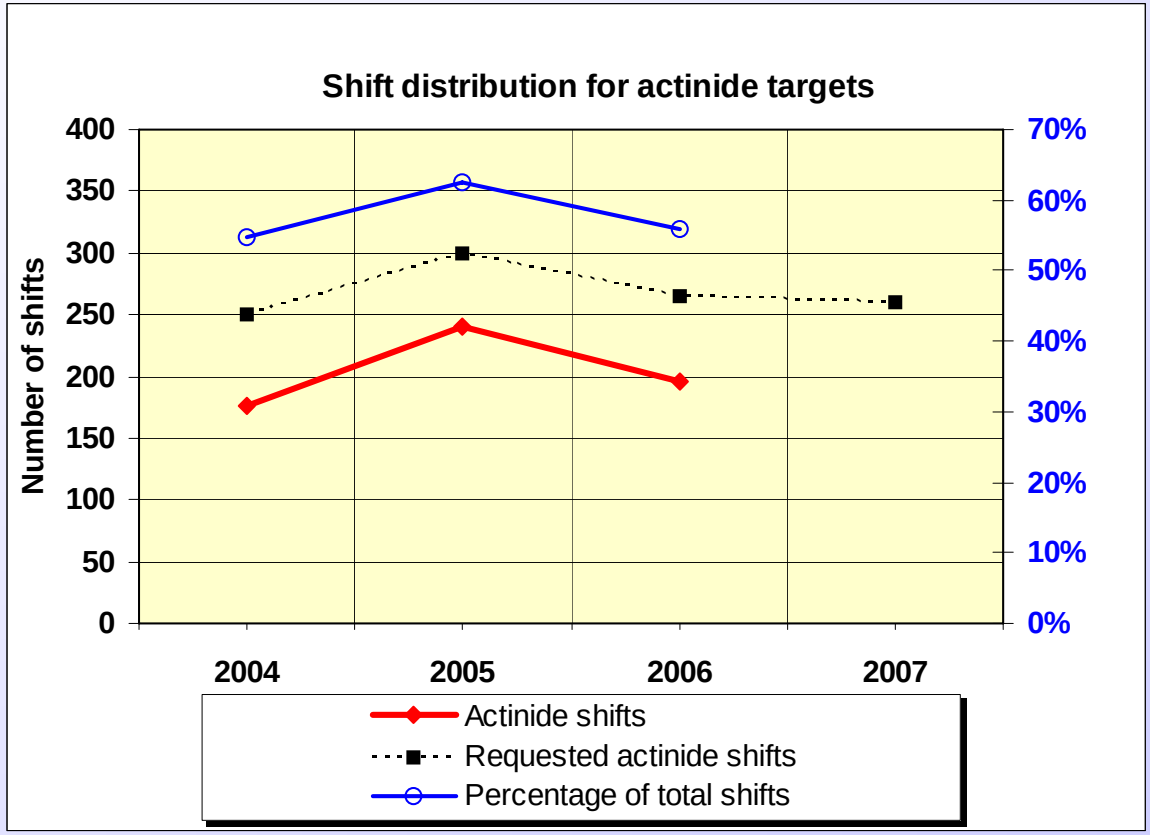
- 612.5 out of the 1056 total shifts delivered
- ~17 shift per new target unit

→ Radioactive cool down time in schedule

I. Actinide targets – forecast

✓ Shift distribution

→ Below request



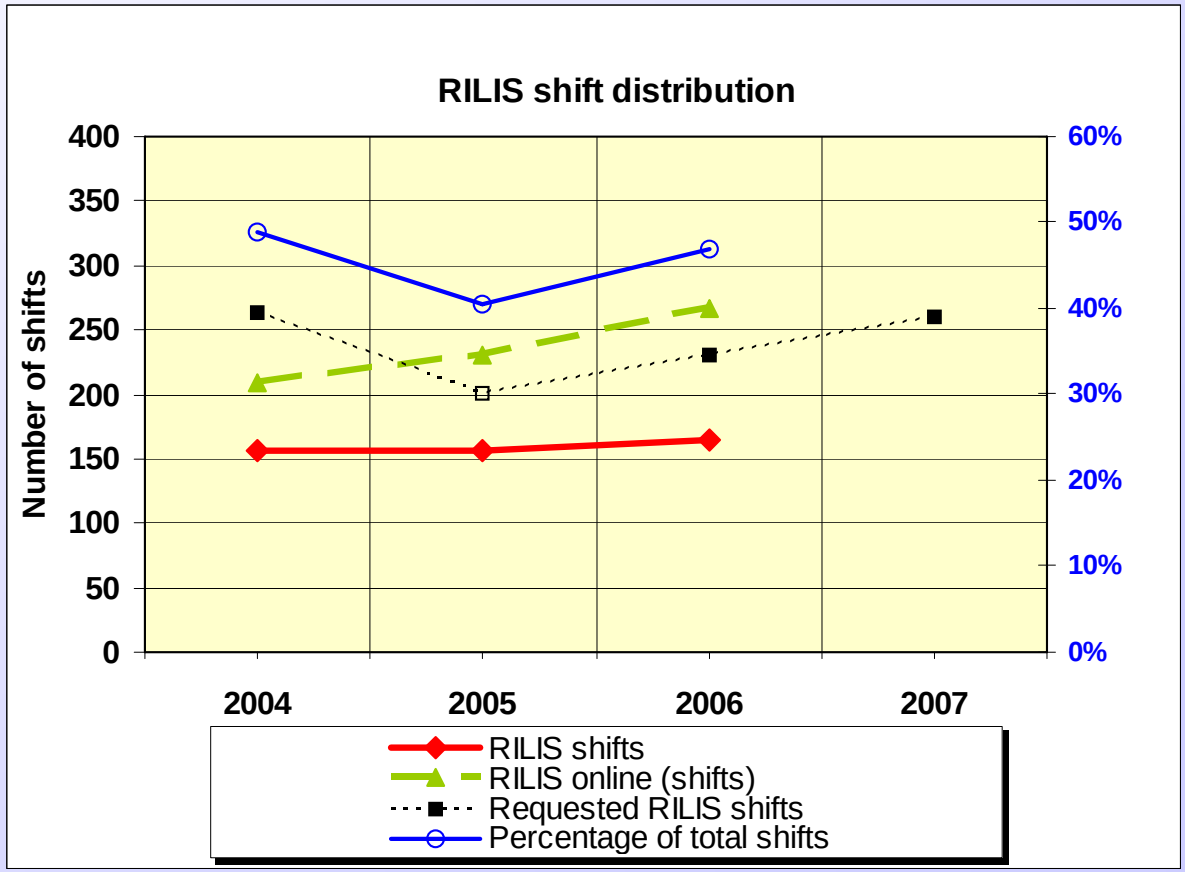
✓ For a year with 375 RIB shifts delivered

→ ~ 215 shifts with actinides

→ **~13 ± 1** target units/year (this includes R&D)

II. RILIS 2004-2006

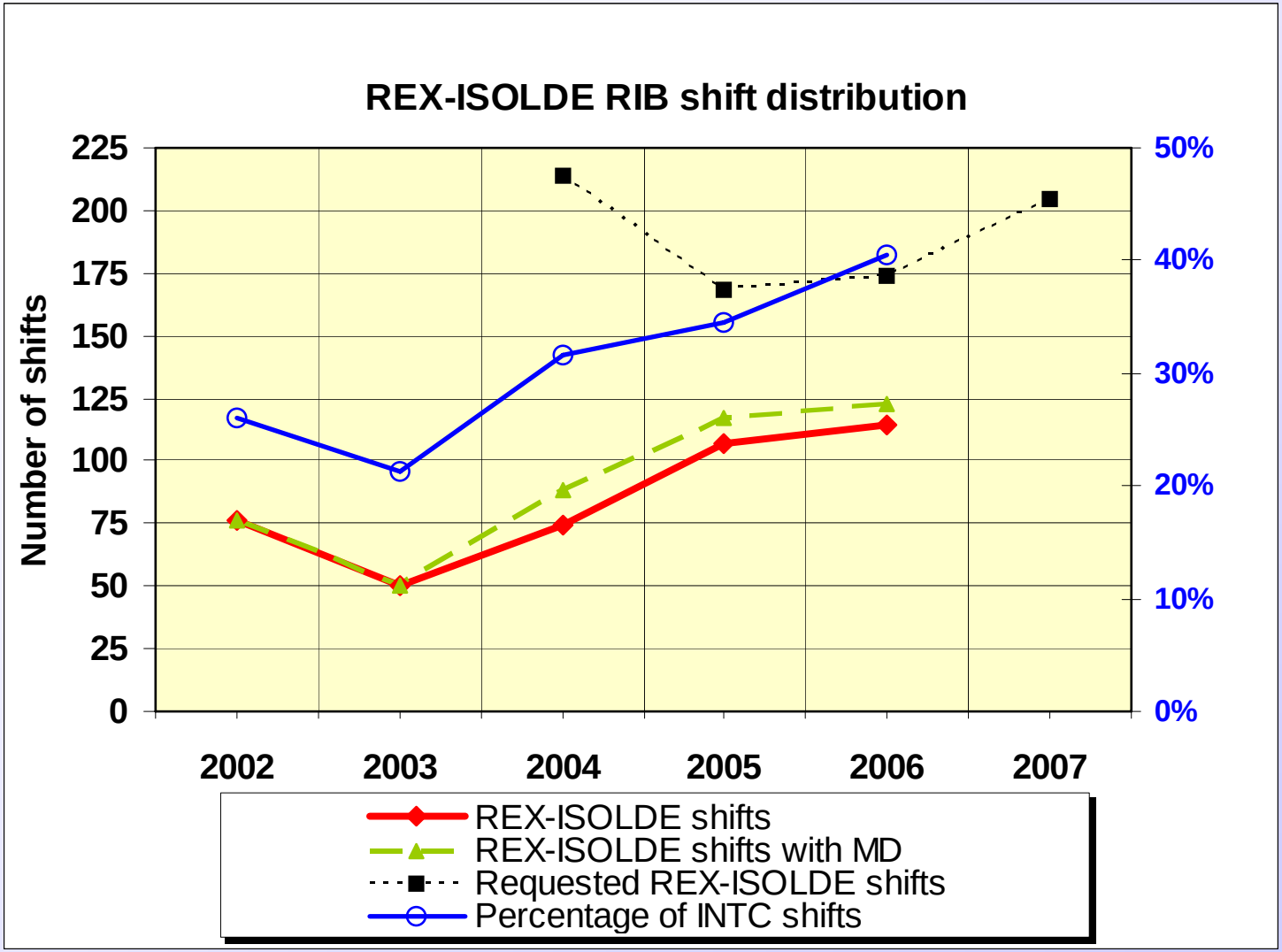
- ✓ 477 shifts (45% of total) delivered 2004-2006
  - → 50% of the shifts on INTC categories (428 / 854)
- ✓ 5650 hours (706 shifts) of online operation
  - → including setup, stable operation, etc
  - → +570 more of offline runs & development
- ✓ Below request



II. RILIS – forecast

- ✓ Demand
  - → Already very high
  - → Expected increase
- ✓ Already difficult to schedule due to operation
  - → ~50% beam time
- ✓ Upcoming developments
  - → RILIS upgrade + LARIS offline lab
  - → RILIS + low work function cavities
  - → LIST
- ✓ For a 375 shifts year
  - → >170 shifts using RILIS
  - → >250 shifts = 2000 hours online
    - + offline operation (10%)

III. REX-ISOLDE 2002-2006



III. REX-ISOLDE – forecast

- ✓ Request
  - → Extremely high already now
  - → 45 radioactive isotopes of 17 elements in 5 years
  - → Increase expected after energy upgrade
- ✓ Average 45% of INTC shifts in the coming years
  - → 135 shifts/year + 10% MD time ~ 150 RIB shifts
  - → This is the schedule limit at present
    - Preparation time
    - Operation / maintenance
    - Other runs (REXtrap / WITCH)
- ✓ Up to 50% of the INTC shifts ~2009
  - → 150 shifts/year + 10% MD time ~ 165 RIB shifts

IV. Target R&D 2004-2006

- ✓ Requested to INTC 2004-2006
  - → Development asked in ~15 accepted proposals
  - → 10 endorsed LoIs asking for beam development
- ✓ Beam development
  - · Selectivity/purity
    - → Molecular beams
      - SeCO, SnS (n-rich Sn), REX developments
    - → Alkali suppression
      - Quartz transfer line: Zn/Cd
    - → RILIS
  - · New beams
    - → Negative ion beams, new materials
    - → New RILIS schemes: Hg, Po, Au
    - → Mini-Mono: C, N, O
    - → REX beams

IV. Target R&D 2004-2006

· Higher intensities/faster release

→ Nanomaterials

· Beam manipulation

→ ISCOOL

→ REXtrap developments

✓ Based on ongoing developments

→ 2 beam development projects/year over ~2 years

- i.e. 4 simultaneous projects

→ Other large development projects require extra effort

- ISCOOL

http://cern.ch/isolde-upgrade

Resources forecast – Summary

- ✓ Actinide targets: 215 shifts/year
  - → 13 ± 1 actinide target units/year
- ✓ RILIS: > 170 shifts/year
  - → > 2000 hours/year RILIS online
  - → Laser scheme developments
- ✓ REX-ISOLDE: 150 RIB shifts/year
  - → Up to 165 shifts/year if increase continues
- ✓ Beam development: 2 (biannual) projects/year
  - → Large developments or projects on top

Target and Ion Source R&D

Priority 1

- **IS451**: SrF^{+} REX
- **IS452**: Hg REX
- **IS413**: (Add): ^{14}O
- **P225**: Ge/Se beams
- **P228**: ^{72}Kr [not recommended, but INTC requests high priority]
- **P231**: LIST - ^{62}Ga
- **P232**: Fr suppression (Hg/Tl)

Priority 2

- **P230**: Rare earth beams (fluorides) for mass measurements
- **I70**: ^{44}Ti

Priority 3

- Negative beams (^{30}S) combined with ISCOOL