UNIVERSITY OF BIRMINGHAM

# INDOOR CONTAMINATION WITH FLAME RETARDANT CHEMICALS: CAUSES & IMPACTS

# INFLAME

Stuart Harrad

# WHAT IS "INFLAME"?

- "INFLAME" is a collaborative project funded by the EC under the Marie Curie Initial Training Network programme
- It will run for 4 years starting 1st January 2011
- Co-ordinated by the University of Birmingham (Harrad), it consists of 12 PhD projects and 2 postdoc projects
- There are 9 partners from 5 countries
- Stems from the March 2009 ESF Exploratory Workshop on Indoor Contamination with Persistent Organic Chemicals: An Important Exposure Pathway for People?" chaired by Cindy de Wit

UNIVERSITY OF BIRMINGHAM

# WHAT IS "INFLAME"?

- Aside of the research objectives, an important aim of INFLAME is provide research training to early stage researchers
- The overriding hypothesis that INFLAME will test, is that FRs in everyday consumer goods, toys, and building materials, are contaminating the environment at levels that constitute an important pathway of human exposure to these chemicals, at levels detrimental to human health
- INFLAME has 3 research objectives:
  - RO1 - the mechanisms via which FRs migrate from products within which they are incorporated
  - RO2 - how and to what extent such migration leads to human exposure
  - RO3 - the effects of such exposure

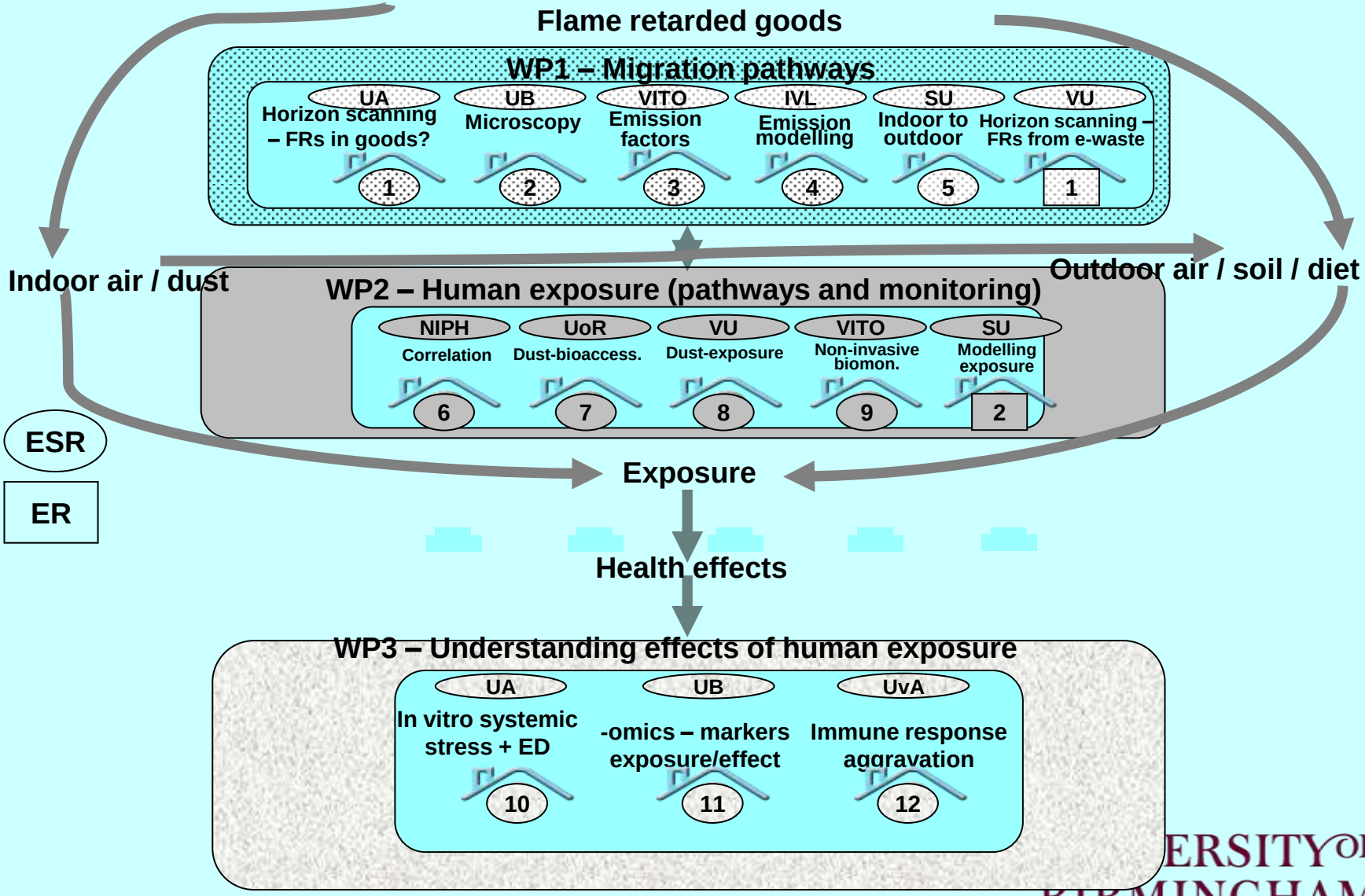
UNIVERSITY OF BIRMINGHAM

# INFLAME WORKPACKAGES

- Each RO of INFLAME is addressed by a workpackage (WP)
- WP1 – Migration Pathways - consists of 6 projects (5 ESRs and 1 ER)
- WP2 – Human Exposure (Pathways and Monitoring) - consists of 5 projects (4 ESRs and 1 ER)
- WP3 – Understanding Effects of Human Exposure - consists of 3 ESR projects
- While each project falls mainly within 1 WP, there are usually overlaps with other WPs

UNIVERSITY OF BIRMINGHAM

# SCHEMATIC OVERVIEW OF INFLAME




ERSITY OF BIRMINGHAM

# ESR2

- ***Using forensic microscopy to elucidate pathways of BFR migration into indoor dust***
- Forensic microscopic techniques (e.g. environmental scanning electron microscopy (ESEM) and energy dispersive X-ray microanalysis (EDX)) will be utilised to elucidate the mechanisms via which BFRs enter indoor dust. Essentially trying to explain why we see such elevated levels of involatile BFRs like BDE-209 in dust.
- ESR2 will test the hypothesis that more volatile BFRs evaporate from treated goods before partitioning to dust, thus leaving a fingerprint of homogeneous distribution of Br throughout the dust (detectable via back-scattered electron images and EDS). In contrast, non-volatile BFRs are hypothesised to enter dust via abrasion of particles or fibres from treated goods, thus leaving a highly heterogeneous Br distribution within dust.

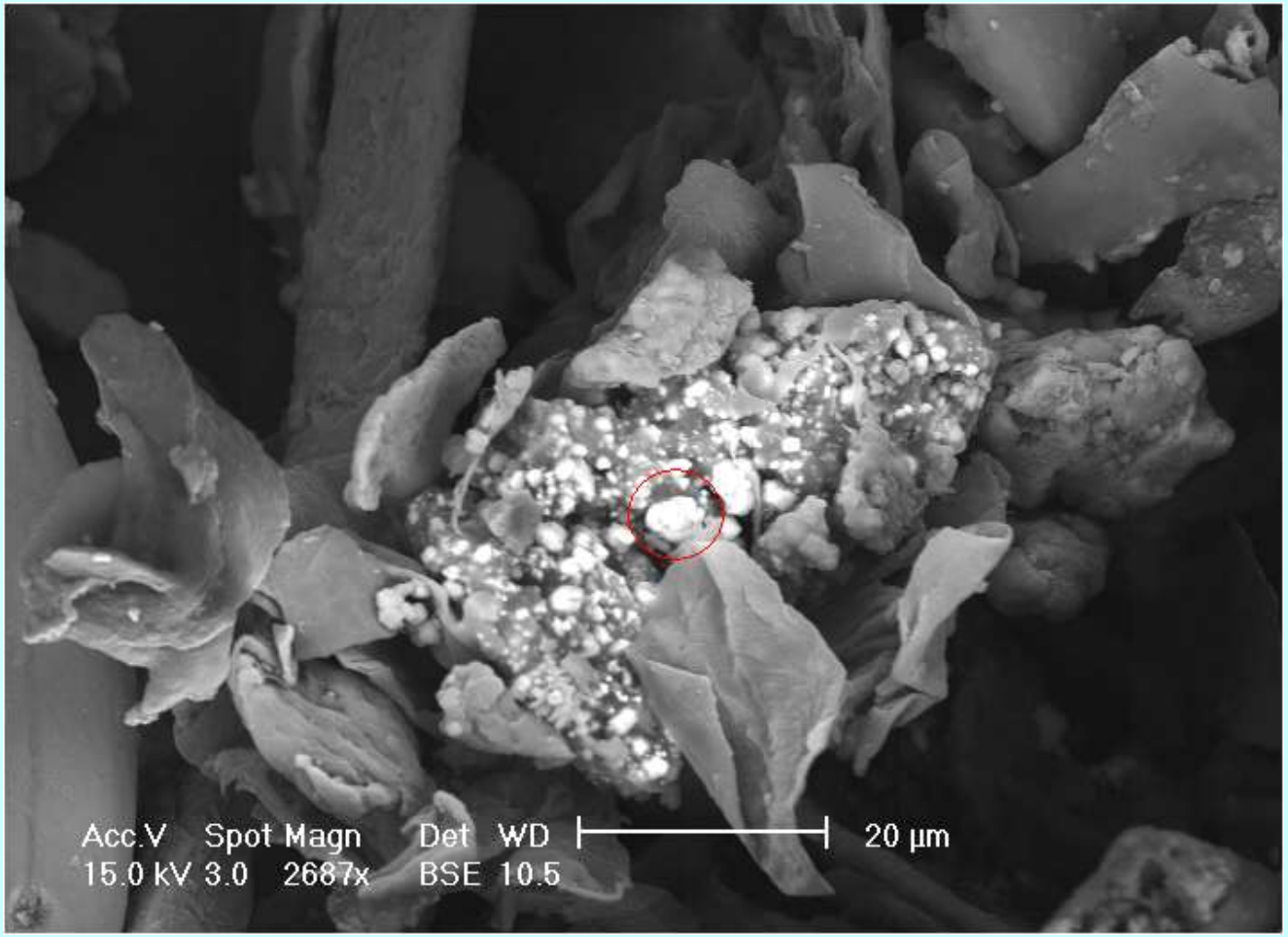
UNIVERSITY OF BIRMINGHAM

# PILOT STUDY RESULTS

- Heterogenous distribution of Br (indicated on ESEM images as shiny white patches) in high BDE-209 dust (0.26% BDE-209) suggests contamination arises as a result of a small number of physically abraded fibres or particles that are highly contaminated

UNIVERSITY OF BIRMINGHAM

# ESEM OF HIGH-BDE 209/LOW HBCD DUST SAMPLE



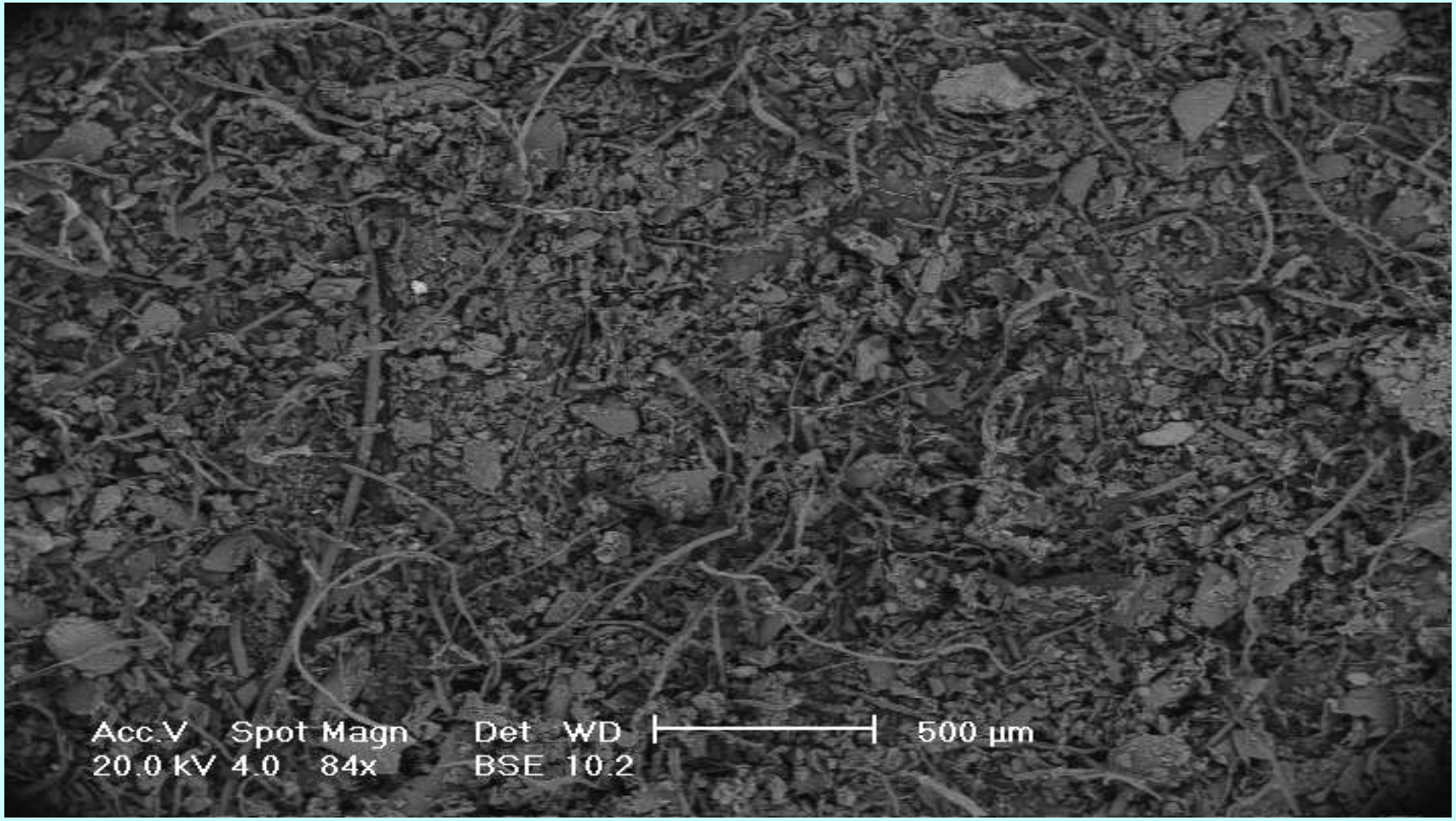

UNIVERSITY OF BIRMINGHAM

# PILOT STUDY RESULTS

- By comparison, homogeneous distribution of Br in high HBCD dust (100,000 ng/g) more consistent with volatilisation from treated materials followed by sorption to dust

UNIVERSITY OF BIRMINGHAM

# ESEM OF HIGH-HBCD/LOW BDE-209 DUST SAMPLE




UNIVERSITY OF BIRMINGHAM

# POTENTIAL WORKPLAN

- Presence of Br alone does not confirm presence of BFRs nor of a specific BFR
- Will use micro-manipulator tools to isolate individual high Br fragments from highly contaminated dust samples
- Once sufficient mass acquired to allow sample weight to be recorded, can analyse combined fragments for BFR content
- Will examine some dust samples arising from emission chamber experiments at VITO where the main BFR emitter is known (along with others possibly from CHEMITECS at IVL & micro-emission chamber experiments at UB)
- Also provide some dust samples for bioaccessibility testing at UoR – testing hypothesis that bioaccessibility will be lower where BFR is heterogenously incorporated within fragments of FR-treated material as opposed to homogenously distributed due to volatilisation followed by sorption

UNIVERSITY OF BIRMINGHAM

# FINANCIAL "ISSUES"

- In addition to costs paid to fellows, overheads and management costs, there are 2 other cost categories.
- Category D to meet the "participation expenses" of fellows = €600/researcher month (RM). These include: lab consumables/equipment & attendance @ conferences (NOT INFLAME events)
- Category E to meet the research/ training/ transfer of knowledge costs = €1200/RM. These include: recruitment costs, costs of INFLAME events (speakers, room hire, refreshments), publications (inc. page charges), T&S costs of attending INFLAME events (like today's for both supervisors and fellows) and T&S of fellows while undergoing secondments/ visits (claimed from budget of main host NOT secondment/ visit host)

UNIVERSITY OF BIRMINGHAM

# FINANCIAL "ISSUES"

- ***How will category D costs assigned to a fellow be managed when they are on secondment?***
- **Could transfer funds pro-rata from main to secondment host**
- **However, suggest not to do this, as:**
- **It will not only be time-consuming admin, but…**
- **Over the duration of INFLAME, net loss/gain by each partner associated with secondments is likely to be essentially cost neutral. What net "receiving" partners "lose" by paying for lab costs (from category D) of seconded fellows hosted, they "gain" on paying less from category E for meeting T&S costs of their seconded fellow(s) - VIEWS?**

UNIVERSITY OF BIRMINGHAM

# FINANCIAL "ISSUES"

- ***How are INFLAME events funded?***
- **Travel/hotel costs met by attendees direct from their category E budget**
- **Other costs (network dinners, lunches, room/equipment hire, guest speaker costs, meeting packs etc.) suggest met locally by host from their category E costs, BUT recovered by redistributing appropriate sum from Category E budgets of other partners. E.g. if meeting costs = €2000, then the category E budget received by the hosting partner increases by €2000 - (per delegate cost x #of delegates from the hosting partner), and the category E budget for all other partners is reduced by (per delegate cost x #of delegates from that other partner)**
- **This will require ATC and other meeting budgets to be reasonable and agreed in advance**
- **Redistribution to take place via co-ordinator at appropriate points in time**

UNIVERSITY OF BIRMINGHAM

# ATC MEETINGS/NETWORK CONFERENCE

- ATC content to follow at least broadly the outlines included in the DoW
- Organisers to prepare programme and proposed budget at least 3 months in advance and circulate via co-ordinator
- Organisers and co-ordinator will promote event both within and external to INFLAME
- Network conference will require more advanced planning. To include presentations from all fellows, but open to other researchers also (both as delegates and presenters)
- Should charge external delegates at a rate that covers costs

UNIVERSITY OF BIRMINGHAM

# PROJECT MEETING SCHEDULE

| Host | Description | Date |
|---|---|---|
| UA | Supervisory Board (SB) Meeting | June 11 (Sept 11??) |
| UA | ATC2 Monitoring FR exposure | June 11 (Sept 11??) |
| VU | ATC1 Monitoring FRs in the environment | May 11 (Sept 11??) |
| UB | ATC3 Effects of Exposure to FRs | Sept 11 (Oct/Nov 11??) |
| UB | Orientation event | Sept 11 (Oct/Nov 11??) |
| IVL | SB Meeting | Jan 12 (April 12??) |
| IVL | ATC4 Mathematical modelling | Jan 12 (April 12??) |
| IVL | ATC5 Role of Science outside academia | April 12 (June 12??) |
| NIPH | SB Meeting | June 12 (April 13??) |
| UoR | Mid-term review meeting | Oct 12 |
| IVL | SB meeting | June 13 (Sept 13??) |
| IVL | Network conference | June 13 (Sept 13??) |
| VU | SB meeting | Jan 14 (April 14??) |
| VITO | SB meeting | Sept 14 (Sept 14??) |

# REPORTING SUMMARY

- Progress reports to REA Dec 11, Sept 12 (Mid-term report) Dec 13
- Periodic reports to REA Dec 12, Dec 14 (Final report)
- Annual financial reports to REA Dec 11, 12, 13, 14
- Fellows have to complete on-line questionnaires at various points
- Copy of ITN reporting requirements to be circulated
- Please forward to me details (e-prints) of any publications/conference presentations arising from ESR/ER projects
- Progress reports by individual fellows (guide maximum 2 page summaries) every 6 months from fellow start date. Submit to DoR and me

UNIVERSITY OF BIRMINGHAM