ResearchBytes

Chris Hankin
Director of Research

WelcometotheAutumntermeditionoftheResearchNewsletter.The RAEresultsaren owpublicandonceagainweweregraded 5*.Wecan nolongersaythatweare thelargest5*Department,butwecansaythat wearethelargestDepartmentthathasbeenconsistentlytop -rated. Congratulationstoyouall!

Sincethesummertermedition,theDepartmenthasseenaninvestment ofover£7m(announcedgrants)fore -science –welldonetoJohn,Yike andtherestofICPC.TheInternationalReviewofUKresearchin ComputerSciencehasbeenpublishedandsayssomeverypositive things aboutthestateofComputerScienceresearchintheUK (including aspecificmentionofourDSEgroup).

Research Review

DARTProject

AconsortiumconsistingofUniversityofTorino,UniversityofGenova,andHeriotWattUniversity,and ImperialCollege,obtainedaGlobalComputingEuropeanCommuni tygrant,calledDART.Thecoordinator atImperialCollegeisSophiaDrossopoulou.Theprojectstartsonthe1stJanuary2002,andChristopher Anderson,anMEng4graduate,willbetheResearchAssociateonthatgrant.

IndustrialLiaisonUpdate

NicolaRogershassecuredsomemoneyforanUndergraduatePrize.ThecompanysponsoringitisDST Internationalandtheyhavepledged£3000,tobegivenoutasprizesof£1000over3years.Theprizewas duetobeapprovedbyAcademicCommitteewhenitmeti nearlyDecember.

If youwouldlike toknowmoreaboutDST theyhaveawebsiteatwww.dstinternational.com

FEASTProjectsbyMannyLehman

TheFEASTprojectsterminatedofficiallyinMarch2001,FEAST/1havingrunfromOctober1996to September1998and FEAST/2fromApril1999toMarch2001butgroupactivitycontinuedtillSeptember. Theinvestigationssetouttostudythephenomenonof *softwareevolution* ;todeterminetheroleandimpact of *feedback*onsoftwareprocessesandontheirimprovement.Asev idencedbytheobservedregularitiesin patternsandtrendsofevolutionaryattributes,theFEASTobservationssupportthehypothesisthatprocess behaviourisconstrainedbyits *systemdynamics.* Thelatterrelatestothefeedbackmechanismsandloop - structuresofthe *full*processthatinvolvesanalysts,developers,domainspecialists,supportpersonnel, marketeers,managers,otheragents,methodsapplied,toolsused,users,etc.Successdependsontheir aggregatedactivityandisultimatelyreflectedinst akeholdersatisfaction.Sustainableimprovementrequires feedbackmechanismstobetuned.Inthesoftwareprocessthisis,however,rarelydone.Thus,thecomplex communicationandcontrolloop -structurewithitsmanyforwardandfeedbackpaths,impliesam ongstother things,thatthescopeformanoeuvre,intermsofachievablesystemgrowthorevolutionrateforexample,is moreconstrainedthanisnormallyassumed.

Thepresenceoffeedbackphenomenonainsoftware -andother -processesisclear;practica lmeansforits masteryarelessobvious.Itrequires, *interalia* ,theuseofmetrics,models,interpretationsthatfacilitate reasoningaboutprocess -feedback-loopstructures.Thisisillustratedby,forexample,theFEASTuseof simulationmodelstoasse ssatheimpactofalternativeevolutionstrategies.The35managementrulesand guidelinesderivedfromtheFEASTobservationsprovideanotherexample.Thesehaveapotentialto significantlyincreaseprospectsforstakeholdersatisfactionoverapplication lifetime.These,andmanyother, FEASTresultswerederivedbyanalysisofdatareceivedfromsomeofthecollaborators [1],andfromtheir contributionsatthequarterlyprojectworkshops.Despitethefactthatthesystemsanalysedcamefrom diverseapplicat ionandimplementationdomainsandthattheydisplayedsomedifferencesinthedetailof theirevolutionarybehaviour,thegeneralbehaviourwasremarkablysimilar,largelyreplicatingthatobserved inthe1970sstudies.Thenewerresultsnecessitatedonly minormodificationofearlierobservationsas encapsulated,forexample,inthelawsofsoftwareevolution.

TheFEASTprojectscontributedsignificantlytoincreasedunderstandingofthesoftwareevolution phenomenonandtospreadinginterestinthetopi casillustratedbyactiveresearchgroupsintheUK,USA, Europe,AustralasiaandJapan.TheincreaseininterestisexemplifiedbyachangeofnameoftheJournalof SoftwareMaintenancetoJournalofSoftwareMaintenanceandEvolutionandthe,nowannua l,IWPSE workshopatthemostrecentofwhich(Kanazawa2000,Vienna2001)theFEASTgroupwasinvitedand gavetheKeynoteLectures.IncontrasttoFEAST,wherethefocuswasonunderstandingthe"what"and "why"oftheevolutionphenomenon,theemphasis ofthemajorityofthegroupsisonthe"how"of evolution,onmethodsandtoolsto *change*software.Activeinterestintheformerissueisalsoneeded.

Understandingofthephenomenonhasnowreachedalevelwhereformalisationcanprovidebenefitssuch as, inlinkingrulesandguidelinestophenomenologicalobservations.Inthisregard,aprojectproposal,SETh - AnApproachtoaTheoryofSoftwareEvolutionhasbeensubmittedtoEPSRC.Theproject,includinga groupofindustrialcollaborators,expects toinitiateformationofatheorybased, *interalia* ,onempirical generalisationssuggestedbyFEASTandothersoftwareevolutionresearch.

TheFEASTprojectswerelimitedtoastudyofwhatcouldbetermedtheclassicalsoftwareprocessas variouslyprac tisedinindustryforthelastfortyyearsorso.Asecondprojectproposal,EPiCS,isinthefinal stagesofpreparationandcollaboratorsthatcanofferaccesstotheirprocessesarecurrentlybeingsought.It ishopedtoaddresstheextensionofthefee dbackandevolutionstudiestosoftwareprocessparadigmssuch asOO,componentandCOTSbasedarchitecture,opensourceprogrammingandsoon.

Detaileddiscussionofthesoftwareevolutionphenomenon,theFEASTresultsandotherinformation, includinga fullerversionofthisarticle,canbefoundvialinksfrom http://www.doc.ic.ac.uk/~mml/feast.

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[1]CollaboratorswereBT(FEAST/2only),DERA,ICL,Logica,Matra -BAeDynamics,LucentTechnologies(*defacto*)

RecentGrantAnnouncements

✔ J.Darlington,"L ondonRegionalE -ScienceCentre ",£488,000forthreeyears.

✔ J.Darlington,"e -SciencePortalatImperialC ollege",£605,296startingJanuary2002.

✔ J.Darlington,"RealityGrid -atoolforinvestigatingcondensedmatter&Materials", £3,331,471,forthreeyears,startingJanuary2002.

✔ J.Darlington,"Effectivemulti -userandmulti -jobresourceutilisat ion",£231,119fortwo yearsstartingDecember2001.

✔ J.Darlington,"Anopenmulti -disciplinaryparallelcomputingresourceforImperialCollege". £199,750forthreeyearsstartingJune2002.

✔ YGuo,"DiscoveryNet -ane -Sciencetestbedforhigh throughputinformatics",£2,082,704 for3yearsstartingOctober2001.

✔ DRueckert,"BuildingaProbabilisticAtlasoftheHeartusingMRImaging",£244,228for threeyearsstartingJanuary2002.

✔ DRueckert,"Buildingapatient -specificmodelofthe heartforintegrateddiagnosisand treatmentoftachyarrhythmiasbyRFablation",£168,986for3yearsstartingOctober2001.

✔ BRustem/JDarlington,"ParallelAlgorithmsforWorst -CaseModellingandRisk ManagementofDynamicSystems",£223,202for 3yearsstartingOctober2001.

✔ OMencer,"FASTSTREAM -DataTypesandElementaryFunctionsforCustom Computing",£66,058for3yearsstartingOctober2001.

✔ WLuk,"SpeedPaint:acustomisedcomputingsolutionfordigitalfilmmaster",£135,836 fortwoyearsstartingJanuary2002.

✔ FToni/FSadri,"SOCS:Acomputationallogicmodelforthedescription,analysisand verificationofglobalandopensoc ietiesofheterogeneouscomputer s",£278,422for3years startingJanuary2002.

✔ JM agee/JKramer,"STATUS:SoftwareArchitecturethatsupportsUsability",£182,387 (ICSTMshare),for3yearsstartingDecember2001.

✔ SDrossopoulou,"DART:DynamicAssembly,ReconfigurationandType -checking", £120,600(ICSTMshare),for3yearsst artingJanuary2002.

✔ GZYang,"VIS -a-VE:VisualAugmentationforVirtualEnvironmentsinSurgical Training",£232,427for3yearsstartingJune2002.

ConferenceCorner

ReportbyIainPhillips

Iattendedthe12thInternationalConferenceonConcurrencyTheory(CONCUR2001),whichwas heldinAugustattheUniversityofAalborginDenmark.Attendancewasgood,withsome150 participants.

TheopeninginvitedspeakerwasRobinMilner(Cambridge)talkingabout"bigraphs",whichare hismostrecentapproachtounifyingvariouspopularprocesscalculus,suchasthepicalculusand theambientcalculus.Thepreviousapproachof"actionstructures"didnotcatchon,sinc epeople preferredtoworkinmoreparticularcalculi.Soaunifyingtheorymustofferextratechniquesfor existingcalculi.Thepromiseofbigraphsisthat,givenaproc esscalculuswithanassociated notionofreaction,alabelledtransitionsystemcan bygeneratedbythegeneraltheoryof bigraphs.InbigraphstheconceptofnamesisasimportantasitwasinCCSandthepicalculus, buttheinnovationsarethatlocationsarenowafirstclassconcept,andgraphsaremorethanjust anaidtothought. BigraphswerepartlyinspiredbyPhilippaGardner'sworkonfusions.

MyowntalkwasonaddingprioritiestoCCS -Igotanumberofusefulcommentsand suggestions.

TherewassomediscussionofhowthesubjecthasmovedonsincethefirstCONCURin1990 . Thepicalculuscontinuestogeneratepapers.Perhapsthemostobviousdifferenceisthatmodel checkingandprobabilistic/stochastictopicsloommuchlarger.

IalsoattendedtheExpressworkshop(programcommitteeincludingPhilippaGardner)which precededthemainconference,whichhadsomegoodtalks,includingachallengebyK.V.S. Prasad(Chalmers)totheprevailingorthodoxyontranslationsbetweenlanguages,namelythat theyshouldsimplypreserveandreflectappropriateequivalences.Iwouldsay thatheisright thatthereshouldbemore(andmanytranslationdoinfactoffermore),butitishardtoputitinto atheorem.

TheconferenceexcursionwastothenorthoftheJutlandpeninsula.Thetwohighlightswerethe RabjergMile,agiantheapo fsandwhichissteadilycrossingNorthJutlanddrivenbythewind, destroyingeverythinginitspath,andtheSkagensGren,theplaceatthetipofthepeninsula whereyoucanwalkintotheseaalongatinyspitofsand,andplaceonefootineach"ocean" (the SkagerrakandtheKattegat).Inthelattercasethemetaphorwasclear -CONCURhasonefoot intheoryandonefootinpractice.Astotheformer,Iamstillnotquiteclearwhattheorganisers hadinmind.

New Members of Staff

ProfessorStephenMuggleton

MrsAmaniEl -Kholy

Academic Promotions

Warmestcongratulations

ToGuang -ZhongYang,

promoted

toaChairinMedicalImage

ComputingfromOctober.

NewPhDs

GillianHill(SteveVi ckers)

FrancisBunnin(YikeGuo&JohnDarlington)

JieunKim(DuncanGillies)

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